NACOB

NORTH AMERICAN CONGRESS ON BIOMECHANICS
OTTAWA 2022

AUGUST 21 – 25 2022

Shaw Centre

Ottawa, Canada

#NACOB2022

www.NACOB.org

NACOB 2022
Program at a Glance
Ottawa, Ontario August 21 - 25, 2022

Time	21/Aug		22/Aug						23/Aug						24/Aug						25/Aug					
7:30 AM																										
7:45 AM			Opening Remarks (7:45 - 8:00)																							
8:00 AM	Diversifying your Workplace	Multifractal Methods for Movement Science	Keynote Lecture 1: Dr. David Moher (8:00 - 9:00)						Keynote Lecture 2: Dr. Adam Douglas (8:00 - 9:00)						Keynote Lecture 3: Dr. Katja Mombaur (8:00 - 9:00)						Keynote Lecture 4: Dr. Kharma Foucher (8:00 - 9:00)					
8:15 AM																										
8:30 AM																										
8:45 AM																										
9:00 AM			Transition						Transition						Transition						Transition					
9:15 AM																										
9:30 AM			CSB Career Award (9:15 - 10:15)						ASB Borelli Award (9:15 - 10:15)						ASB Hay Award (9:15 - 10:15)						Movement Disorders	Symposium: Balance control	Trunk & Spine 2	Motion Analysis/ Methods	Orthopaedic Biomechanics	Sport Injuries 2 - Head Trauma
9:45 AM																										
10:00 AM																										
10:15 AM			Coffee Break at Vendor Exhibits (10:15 - 10:45)						Coffee Break at Vendor Exhibits (10:15 - 10:45)						Coffee Break at Vendor Exhibits (10:15 - 10:45)						Coffee Break (11:00 - 11:30)					
10:30 AM																										
10:45 AM			Preawarded (ASB Pre-Doc, ASB Early Career, CSB David Winter Early Career) Session (10:45 - 12:15)						CSB MSc and PhD Awards Sponsored by Theia Markerless (10:45 - 12:15)			ASB Journal of Biomechanics and Clinical Biomechanics Award Session (10:45- 12:15)			ASB Goel, Pytel and Founders Award Session (10:45 - 12:15)	Symposium: Markerless motion capture	ACL	Balance and Falls	Musculoskeletal Modelling & Simulation 1	CSB Symposium: Francophonie in Biomechanics	Symposium: Wearable sensors for lower extremities	Upper Limb 2	Sport Performance	Aging	Tissue Mechanics 3
11:00 AM																										
11:15 AM																										
11:30 AM																										
11:45 AM																										
12:00 PM	Lunch on Own																									
12:15 PM			Lunch at Vendor Exhibits (12:15 - 1:30)		Diversity Lunch		Mentorship Lunch		Lunch at Vendor Exhibits (12:15 - 1:30)		CSB Annual General Meeting				Lunch at Vendor Exhibits (12:15 - 1:30)		ASB Annual General Meeting				Lunch at Vendor Exhibits (1:00 - 2:15)					
12:30 PM																										
12:45 PM																										
1:00 PM	Canadian and United States Federal Funding for Biomechanics Research																									
1:15 PM																										
1:30 PM			Symposium: Skeletal muscle scaling	Metabolics/ Energetics of Locomotion	Military and Veterans' Health	Assistive Technologies & Robotics	Imaging 1 - Bone	Sport Injuries 1	Symposium: Virtual reality for physical rehabilitation	Locomotion 1	Ergonomics & Occupational Biomechanics 2	Tissue Mechanics 1	Neuroscience & Motor Control	Symposium: Running	Symposium: Open-source multi-modal kinematic imaging	Rehabilitation	Wearables 1	Muscle Mechanics	Tissue Mechanics 2	Upper limb 1 - Shoulder						
1:45 PM																										
2:00 PM																										
2:15 PM																										
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2:45 PM																										
3:00 PM	Keys to Successful Oureach Programs	A Clinical Trials Tutorial for Biomechanics	Coffee Break at Vendor Exhibits (3:00 - 3:30)						Coffee Break at Vendor Exhibits (3:00 - 3:30)						Coffee Break at Vendor Exhibits (3:00 - 3:30)						Symposium: Pediatric Orthopaedic Biomechanics	Wearables 2	Lower Limb	Upper Limb 3	Locomotion 3	Thematic Poster Session 4
3:15 PM																										
3:30 PM			ASB Symposium : BACPAC	Symposium: Trail Running	Knee osteoarthritis	Insights on Slips, Trips, Falls	Ergonomics & Occupational Biomechanics 1	Thematic Poster Session 1	CSB Symposium: Fall-related head impacts and injury	Symposium: Non-metabolic minimization factors and movement	Locomotion 2 - Prostheses & Orthoses	Trunk & Spine 1	Imaging 2 - Soft Tissue	Thematic Poster Session 2	Symposium: Understanding bone at many length scales	Artificial Intelligence	Musculoskeletal Modelling & Simulation 2	Footwear/ Feet	Animal Models and Comparative Biology	Thematic Poster Session 3						
3:45 PM																										
4:00 PM																					Awards & Closing Ceremony (3:45 - 4:15)					
4:15 PM																										
4:30 PM																										
4:45 PM																										
5:00 PM	Free Time		Poster Session 1 & Exhibitors (5:00 - 7:00)						Early Career Faculty Professional Development (ASB/CSB ECR Symposium)			Trainee Professional Development (Roundtable Discussions)			Poster Session 2 & Exhibitors (5:00 - 7:00)						Free Time					
5:15 PM																										
5:30 PM																										
5:45 PM																										
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6:30 PM																					Conference Dinner (6:30 - 10:00)					
6:45 PM																										
7:00 PM	Networking Event (Sens House)		Reception at the Museum of History (with first 30 minutes for Bus Travel/Walking)						CSB/ASB Student Social (Heart & Crown) 7:00 - 10:00			Free Time			Women in Science Event			Free Time								
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WELCOME

DEAR DELEGATES, COLLEAGUES, AND FRIENDS

We are honoured to welcome you to Ottawa for the 2022 North American Congress on Biomechanics, a joint meeting between the Canadian Society for Biomechanics / Société Canadienne de Biomécanique (CSB/SCB) and the American Society of Biomechanics (ASB). The city of Ottawa is located within the traditional unceded territory of the Anishinàbeg Algonquin Nation and has long been an important meeting place. Since several rivers join here, the area was an active transportation corridor for an astounding diversity of Indigenous groups and travellers. In fact, the city's name is derived from the Algonquin word "Odawa," meaning "to trade." The Ottawa region's identity has been influenced by many cultures, including First Nations, French, English, Scottish and Irish. Now, as Canada's Capital, it is the perfect place for us to meet and for you to experience some of our country's best attractions in one welcoming city.

As one of the first in-person meetings since the Global Pandemic, we are extremely excited to welcome our Canadian, American, and International Colleagues to Ottawa. We have been working on the congress planning for over five years, and after many unknowns, we are thrilled and relieved that the conference is proceeding as we envisioned many years ago. We have an excellent scientific program planned with world-class keynote speakers, lectures from CSB and ASB award winners, workshops on topics spanning from outreach and diversity to scientific methods, as well as a number of exciting symposia and oral/poster presentations in key topical biomechanics themes. We are also proud to bring this to you at the award-winning Shaw Centre, which sits on the bank of the Rideau Canal – a UNESCO World Heritage site. We hope you will find the time to explore all the key cultural, culinary, and outdoor activities that only a Capital city can offer (e.g., Parliament Hill, 7/9 of Canada's National Museums, Gatineau Park, and more).

We would also like to thank the many people and organizations who have helped make this conference possible. Special thanks to Theresa Gatto from Ottawa Tourism and the entire Podium Conferences team who have helped us navigate the process from start to end, and have provided support to ensure the success of our conference. Merci à l'Université d'Ottawa, la plus importante université bilingue (anglais et français) au monde, pour le soutien financier et logistique. Thank you also to our sponsors and exhibitors for supporting our congress. Sincere thanks to the ASB and CSB for their support and for entrusting us to host this important event, in particular the members of the organizing committee including Janessa Drake and Shawn Robbins (CSB) and Jason Franz and Ross Miller (ASB). Thank you also to our local organizing members (Allison Clouthier, Thomas Uchida, and Chris Bailey) for your help in creating the scientific program, and to the student committee, including CSB (Jackie Zehr and Franzi

Onasch), ASB (Evan Dooley and Jenny Leestma), and University of Ottawa (Olena Klahsen, Victor Chan, and Blake Miller) representatives – your volunteering and planning of social and training events have been invaluable.

Most of all, thank YOU for joining us here in Ottawa for NACOB2022! We hope that you have a productive meeting, meaningful encounters, and that you enjoy your scientific and social time in Canada's Capital.

Sincerely,

Ryan Graham and Daniel Benoit
NACOB 2022 Co-Chairs

WELCOME MESSAGE FROM CSB/SCB PRESIDENT

A very warm welcome to NACOB 2022 and to our nation's capital, Ottawa! We are so pleased to have this North American meeting hosted in Canada again, and we are grateful for this in-person opportunity to welcome and reunite with our biomechanics colleagues from around the world.

The NACOB meeting represents an important event for our society. Not only is it the biennial conference of our society, but also a great opportunity for our members to further connect with colleagues across the continent and to participate in a collaborative event with our American Society of Biomechanics neighbors. On behalf of the CSB/SCB, I extend a warm welcome to our ASB colleagues for this collaborative meeting, and we welcome non-members to enjoy the conference and make connections with both of our societies.

I would like to sincerely thank the NACOB co-chairs, Dr. Ryan Graham and Dr. Daniel Benoit, for their leadership and extremely hard work in bringing this meeting to Canada, and to planning a fantastic scientific and social program for us to all enjoy. Thank you to your entire team and to all of the volunteers who have jumped in to support this great event.

I look forward to the week with great enthusiasm, and I hope to connect with many of you over the coming days. I wish you all a great conference where you can engage fully in the scientific sessions, workshops, and social activities.

Please enjoy!

Janie Wilson
President, Canadian Society for Biomechanics/Societe Canadienne de Biomecanique
csb-scb.com

WELCOME

WELCOME MESSAGE FROM ASB PRESIDENT

On behalf of the Executive Board of the American Society of Biomechanics (ASB), I welcome you to the beautiful Canadian capital of Ottawa. This year, ASB's 46th Annual Meeting is being held in conjunction with the 22nd Biennial Meeting of the Canadian Society for Biomechanics/Société Canadienne de Biomécanique (CSB/SCB) as the 5th joint meeting of the North American Congress of Biomechanics (NACOB). This is the first NACOB since 2008, when our two societies held their conferences together in Ann Arbor, Michigan. Many thanks to ASB Program Chair, Dr. Jason Franz, Program Chair-Elect, Dr. Ross Miller, Student Representative, Evan Dooley, as well as ASB's extra NACOB student co-representative, Jenny Leestma, for their efforts in organizing our ASB-specific programming. This ASB team met weekly with NACOB and CSB/SBC organizers to create five days jam-packed with outstanding science and learning along with many professional development, social, and diversity activities. Several of these activities are organized by national, international, or ASB affinity groups (including Black Biomechanics Association, Latinx in Biomechanics, International Women in Biomechanics, Teaching in Biomechanics, Early Career Faculty, and Postdocs). I would also like to express our sincere thanks to the teams from the University of Ottawa NACOB organizing committee (Co-Chairs Drs. Daniel Benoit and Ryan Graham, Drs. Allison Clouthier, Thomas Uchida, and Christopher Bailey, and students Victor Chan, Blake Miller, and Olena Klahsen), and CSB/SCB committee (Program Co-Chairs Drs. Janessa Drake and Shawn Robbins, and Student Representatives Jackie Zehr and Franziska Onasch). Thanks also to the staff from Podium Conference and Association Specialists for helping with the operational aspects of the Congress, especially Michelle Smith, Amanda Jay, Vivek Punwani, and Cendrine De Vis.

ASB was founded in 1977 to encourage and foster the exchange of information and ideas among biomechanists working in different disciplines and to facilitate the development of biomechanics as a basic and applied science. ASB has hosted an annual meeting every year since its inception and currently supports numerous student-focused regional meetings, a large number of awards and grants to student and professional members, student chapters at a growing number of universities, and resources for mentoring, career development and teaching. Periodically, ASB holds its annual meeting in conjunction with an international biomechanics organization, such as CSB/SCB, the International Society of Biomechanics (ISB), or the World Council of Biomechanics. ASB's last joint meeting in Canada was held in conjunction with the 27th ISB Congress hosted by the University of Calgary in 2019 (ISB/ASB 2019). That meeting was the last ASB Annual Meeting where we were able to congregate together in-person. ASB was fortunate to be able to hold two very successful and well-attended virtual annual meetings

(vASB2020 and vASB2021), hosted by the optimistic meeting committee at Georgia Tech/Emory University in Atlanta, Georgia. NACOB 2022 provides a unique opportunity to not only come together in person again, but to interact with a broader and more diverse group of scientists, clinicians and engineers than at typical ASB meetings. I encourage every ASB attendee to take full advantage of this opportunity.

Once again, on behalf of the ASB Executive Board, I wish all attendees an intellectually stimulating and memorable meeting ... that also includes a bit of fun!

Elizabeth Hsiao-Wecksler, PhD

Professor, University of Illinois at Urbana-Champaign
President, American Society of Biomechanics

SOCIETY INFORMATION

CANADIAN SOCIETY FOR BIOMECHANICS/ SOCIÉTÉ CANDIENNE DE BIOMÉCANIQUE

Formed in 1973, with over 250 members and representation from all over the world, the purpose of the Society is to foster research and the interchange of information in all fields of Biomechanics.

EXECUTIVE BOARD

Janie Astephen Wilson, *President, Dalhousie University*

Andrew Laing, *Past President, University of Waterloo*

Stacey Acker, *Secretary, University of Waterloo*

Scott Brandon, *Treasurer - Member Affairs, University of Guelph*

Janessa Drake, *Communications Officer, York University*

Rachid Aissaoui, *École de Technologie Supérieure*

Diana De Carvalho, *Memorial University of Newfoundland*

Franziska Onasch, *Student Representative, University of Calgary*

Shawn Robbins, *McGill University*

Samuel Veres, *Saint Mary's University*

Jackie Zehr, *Student Representative, University of Waterloo*

csb-scb.com

Canadian Society for Biomechanics
Société canadienne de biomécanique

AMERICAN SOCIETY OF BIOMECHANICS

The American Society of Biomechanics (ASB) was founded in 1977 to encourage and foster the exchange of information and ideas among biomechanists working in different disciplines and to facilitate the development of biomechanics as a basic and applied science.

EXECUTIVE BOARD

Elizabeth Hsiao-Wecksler, *President, University of Illinois at Urbana-Champaign*

Rakié Cham, *President-Elect, University of Pittsburgh*

Nicholas Stergiou, *Past President, University of Nebraska*

Jill Higginson, *Treasurer, University of Delaware*

Maria Pasquale, *Treasurer-Elect, Novel Electronics Inc*

Ana Ebrahimi, *Secretary, University of Wisconsin-Madison*

Jason Franz, *Program Chair, University of North Carolina*

Ross Miller, *Program Chair-Elect, University of Maryland*

Ajit Chaudhari, *Diversity Chair, The Ohio State University*

Melissa Morrow, *Awards Chair, University of Texas Medical Branch*

Louis DiBerardino, *Education Chair, Ohio Northern University*

Srikant Vallabhajosula, *Communications Chair, Elon University*

Cara Lewis, *Newsletter Editor, Boston University*

Evan Dooley, *Student Representative, University of Virginia*

asbweb.org

ASB American Society of Biomechanics
FOUNDED IN 1977

GENERAL CONFERENCE INFORMATION

Shaw Centre
55 Colonel By Drive,
Ottawa, Ontario, Canada, K1N 9J2

All scientific conference sessions will take place in this location.

WIFI ACCESS

There is WIFI available for NACOB delegates in the meeting space. Please follow the login details below:

Wireless Network: **NACOB WiFi**
Password: **NACOB2022**

REGISTRATION

Conference registration fees include; access to entire conference program (keynote speakers, awards sessions, workshops, symposia sessions, individual orals and dedicated poster sessions), professional development opportunities, welcome & poster .reception, daily lunches and coffee breaks, opportunity to purchase tickets to the banquet dinner at subsidized rates, complimentary WIFI in the congress space, printed or digital program depending on preference, complimentary access to pre-conference workshops and the opportunity to network with colleagues, collaborators and others in the biomechanics community

NAME BADGES

Your name badge is your admission ticket to the preconference workshops, conference sessions, coffee breaks, lunches and receptions. Please wear it at all times. At the end of the conference, we ask that you recycle your name badge in one of the name badge recycling stations that will be set out or leave it at the registration desk.

LOST NAME BADGES

There is a $25 replacement fee for any lost or missing name badges – If you've lost your name badge, visit the registration desk for a replacement as soon as possible.

REGISTRATION AND INFORMATION DESK HOURS

The NACOB registration and information desk, located in the Rideau Canal Atrium will be open during the following dates and times:

Sunday, August 21	7:00am – 7:00pm
Monday, August 22	7:00am – 5:00pm
Tuesday, August 23	7:00am – 5:00pm
Wednesday, August 24	7:30am – 7:00pm
Thursday, August 25	7:30am – 4:00pm

If you need assistance during the conference, please visit the registration desk.

POSTER INFORMATION:

Set-up / Removal

POSTER SESSION 1 – MONDAY AUGUST 22

Set Up:	Between 7:30 – 17:00
Session Time:	17:00 – 19:00
Tear Down:	Please tear down by 17:00 on Tuesday August 23

POSTER SESSION 2 - WEDNESDAY AUGUST 24

Set Up:	Between 7:30 – 17:00
Session Time:	17:00 – 19:00
Tear Down:	Please tear down by 15:30 on Thursday August 25

Posters can also be browsed using the **NACOB congress app, Pheedloop.** You can download the app from the apple store/google play store.

STAFF

NACOB staff from Podium Conference Specialists can be identified by bright orange 'STAFF' ribbons on their name badges. Feel free to ask anyone of our staff for assistance. For immediate assistance please visit us at the registration desk.

MEALS

Two daily coffee breaks and lunches are provided August 22nd-25th for all registrants. All other meals are on own.

Breakfast options

- Daly's Café Express
  6:30am to at the Westin 11:00am daily
- The Westin Ottawa is connected to Rideau Mall that has a food court (access from the 3rd floor of hotel) for quick and easy options at the food court.

DIETARY REQUIREMENTS

If you noted a dietary requirement when registering it will be noted on the back of your name badge. All lunches are grab and go lunch boxes. If your dietary need is specific, there will be a box with your name on it. If you are vegetarian, gluten or dairy free, that will be noted on the boxed lunch.

If you are attending the gala dinner, please place the special diet ticket in front of you when you are seated for the banquet staff to see.

SPECIAL MEETINGS & SOCIAL EVENTS

SUNDAY, AUGUST 21

Networking Event
(Sens House at the Byward Market)

7:00pm – 9:00pm

Stop by the Sens House to catch up with old colleagues, meet new friends and relax in this unique Ottawa pub!

This event is a come and go event with no scheduled activities.

MONDAY, AUGUST 22

Diversity Lunch
(Room 214)

12:15 – 1:15pm

Successes and challenges of achieving work-life balance in academia – are we supporting everyone? Round table discussions facilitated by Michelle Sabick (Dean, Ritchie School of Engineering & Computer Science, University of Denver) and Wayne Albert (Dean, Faculty of Kinesiology, University of New Brunswick). The lunch has a capacity of 100 people, first come, first served. Please pick up a boxed lunch on your way to Room #215 from the main foyer.

Welcome Reception
(Museum of History)
Sponsored by **OptiTrack**

7:00pm – 9:30pm

Meet at the front entrance to the Shaw Centre to walk over to the Museum, a short 15 minute walk, or board one of a few buses for the short transfer.

A stand-up grazing reception in a spectacular Canadian museum is the location for this event.

TUESDAY, AUGUST 23

CSB Annual General Meeting
(Room 213/215)

12:15pm – 1:15pm

All members of CSB are welcome to attend and learn more about the society, its future and current news.

ASB Student Chapter Meeting
(Room 214)

12:15pm – 1:15pm

The ASB Student Body will be hosting the second annual Student Chapters Meeting during lunch. The purpose of this event is for members of ASB Student Chapters to come together to exchange ideas and ask questions about what their chapters have been doing over the past year, as well as provide a space for students interested in starting an ASB chapter to ask any questions they have about the process. The ASB Student Rep, as well as several current chapter presidents, will be on hand to lead a Q&A session, which will be followed by time to break into smaller groups and meet people from other schools.

Early Career Faculty Professional Development
(ASB/CSB/ECR Symposium) (Room 214)

5:30pm – 7:00pm

Sponsored by
C-STAR

This symposium will provide an opportunity to receive advice from the senior ASB and CSB members on topics relevant to setting up an independent research and/or teaching program. The theme of this year's session is "Strategic Planning for Lifelong Professional Success." We hope to see you there! There will also be a social gathering after for those who would like to join!

Trainee Professional Development
(Parliament Foyer)

5:30pm – 7:00pm

This roundtable style event welcomes undergraduate students, graduate students and postdoctoral fellows to speak with and learn from experienced members of the biomechanics community about a variety of topics. Some academic topics will include the preparation of scholarship/fellowship applications for national funding agencies (e.g., NIH, NSF, NSERC, CIHR), manuscript writing and reviewing as well as the differences between pursuing academia in the US and Canada. Non-academic topics will include, but are not limited to: government and industry career paths, technology development and entrepreneurship as well as equity, diversity and inclusion in academia.

Teaching Biomechanics Interest Group
(Room 201)

7:00pm – 8:00pm

The Teaching Biomechanics Interest Group (T-BIG) was started in 2020 among a group of teaching-focused biomechanists. Since that time, they have shared advice and resources, collaborated on projects, and run conference programming to support and further the challenges of teaching in this nuanced field. Examples of these initiatives have centered around promoting undergraduates and undergraduate research, and supporting biomechanists from primarily undergraduate institutions. Biomechanists at all levels and types of institutions are welcome to join.

The affinity group event will be a hybrid-style event, as many from our group will be busy with teaching during NACOB this year. This networking event will include a brief presentation on the accomplishments of the group thus far, short and long term goals, and an open discussion regarding the mission and goals of the group.

CSB/ASB Student Social
(Offsite: Heart and Crown in Byward Market)

7:30pm – 10:00pm

Join us for a lively night out at the Heart & Crown in Byward. Located steps from the convention centre, registration is only $10 and includes minimal food and drink. The NACOB student committee will host a game of trivia beginning at 8pm. Due to space constraints at the venue, capacity for the Trainee Social is limited to the first 300 registrants.

The Black Biomechanists Association Social
(Offsite: Aulde Dubliner & Pour House)

7:30pm – 11:30pm

The Black Biomechanists Association (BBA) is so excited to introduce our non-profit organization and look forward to connecting with you! Our mission is to uplift and enrich Black biomechanists in their academic and professional careers. We hope to continue collaborating with scientific societies, educational organizations, academic institutions, and industry corporations to

provide some much-needed support for our Black students and professionals across the vast disciplines of biomechanics. Please join us for a social event to meet our members and learn more!

WEDNESDAY, AUGUST 24

ASB Annual Business Meeting
(Room 214)

12:15pm – 1:15pm

All members of ASB are welcome to attend and learn more about the society, its future and current news.

Women in Science Event: Elevating and Championing each other through sponsorship
(Room 214)
Sponsored in part by:

7:00pm – 10:30pm

How can we communicate, connect, and inspire confidence for women and underrepresented genders within the biomechanics community? At every career stage, sponsors play a critical role in publicly acknowledging achievements, advocating, and generally using their power and privilege to help their mentees. At this workshop, we will have interactive roundtable discussions addressing topics from finding sponsors to acknowledging bias as a sponsor. Attendees will leave with actionable ways that they can be a better sponsor (at any career stage) for the biomechanics community.

Pre-registration is required

THURSDAY, AUGUST 25

American Baseball Biomechanics Society Annual Business Meeting (Room 214)

1:00pm – 2:00pm

ABBS members and any individuals attending NACOB who are interested in learning more about research related to baseball biomechanics are invited to attend.

Latinx in Biomechanix Social
(Room 214)

4:15pm – 5:15pm

Come connect and socialize as we wrap up NACOB 2022! Latinx in Biomechanics is a social networking group that promotes Latinx representation in biomechanics and general science fields. Meet our group and hear about our upcoming events as well as how you can get more involved with LiB.

Conference Dinner
(Trillium Ballroom)

6:30pm – 11:00pm

Join us for closing dinner in the Trillium Ballroom at the Shaw Centre. Make memories with your friends and colleagues during the last evening of NACOB 2022.

A delicious three course meal will be served followed by an evening of dancing and celebrating the return to conferences!

Cost: $100.00 per person

Pre registration is required

COVID-19

1/ Ottawa Covid helpline1-833-784-4397
2/ Masks will be available at the registration desk for anyone who has forgotten theirs. Kindly supply your own mask in the interest of being environmentally responsible. Masks are not required but are highly encouraged.
3/ Need a test? See where there is one available here Rapid-test-locator
4/ Should you fall ill while in Ottawa we recommend you stay in your room and avoid gatherings of people and public transport until you receive a negative test result
5/ If you have to quarantine yourself and extend your hotel reservation, please contact the front desk of your hotel. The various NACOB hotels will do their best to accommodate room extensions at the group rate.
6/ If you are ill, please do not come to the conference and inform us for tracking purposes at *NACOB@podiumconferences.com*

PARENTING ROOM

Need to step away for feeding time or to spend some time with your child(ren)? The Show Office 2C on the second floor, just outside the Gatineau Salon is available for parents and children during the conference.

PRAYER ROOM/QUIET SPACE

NACOB is pleased to offer a quiet space for personal quiet time. Whether you need a quiet space to gather your thoughts, meditate, or perform your religious observations, please feel free to use The Show Office 2D at any time. Kindly respect others using this space and do not use cell phones, laptops or have loud conversations.

CONFERENCE APP

Download the conference app, Pheedloop for the most current program information, abstracts, and the opportunity to network with other delegates. Create your own schedule, review talks and even make plans for the evenings.

Scan the QR code below to load it on your devices!

KEYNOTE SPEAKERS

KEYNOTE 1

AUGUST 22 8:00-9:00

Increasing our ROI in science: start with better behavior

Scientists publish somewhere between one and 3 million articles a year. A forensic examination of the articles indicates several shortcomings. Some of these will be discussed as will solutions to reduce some of the problems.

David Moher, *Professor, School of Epidemiology and Public Health, uOttawa; Senior Scientist and Director, Centre of Journalology, Clinical Epidemiology Program, Ottawa Hospital Research Institute*

KEYNOTE 2

AUGUST 23 8:00-9:00

Bridging the Gap: Being a 'Pracademic' in the World of Elite Sport

As a "pracademic", Dr Douglas will be presenting about working in both the academic and sport world. Using applied examples and strategies, this presentation will highlight the value that the scientific process can bring to help coaches and support staff make informed decisions to have an impact on the ice.

Adam Douglas, *Sports Science and Performance Director, Club de hockey Canadien, Inc.*

KEYNOTE 3

AUGUST 24 8:00-9:00

Optimality principles in human movement and in human interactions wearable robots

How do humans choose their motions out of an infinite number of ways to perform a given task? How does human movement change with age, or with the level of expertise in sports? How do motions adapt when humans suffer from impairments or when they are supported by wearable robotic technology, such as exoskeletons or prostheses? It is a common assumption that motions of humans and animals – similar to many other processes in nature - are performed in an optimal way due to evolution, learning and training. Optimality principles can be found in the mechanical properties of the executed movements, but also in the closed loop sensory motor system. However, the particular criterion optimized is highly dependent on situation and the person and is difficult to determine, and it often is a hybrid criterion combining multiple optimization goals.

In this talk, I will give an overview of some of our research on investigating optimality principles in human movement and human-robot interaction. To mimic the optimizing property of nature, we formulate motions of humans and their interactions with robots as optimal control problems. An important component of this is a detailed description of the underlying physics in terms of subject-specific models of humans combined with precise models of the robotic systems and a particular focus on the interaction between both. Based on experimental studies of humans we use inverse optimal control to identify the underlying objective functions. I will present different examples of motions in sports and activities of daily living, and evaluating the effect of lower limb and spinal exoskeletons and of running specific prostheses.

Katja Mombaur, *Professor and Canada Excellence Research Chair in Human-Centred Robotics and Machine Intelligence, University of Waterloo*

Sponsored by **Northwestern University**

KEYNOTE 4

AUGUST 25 8:00-9:00

Moving toward better osteoarthritis outcomes with patient-oriented biomechanics research

Can you use gait analysis to tell me what exercises I should do to get better?" "What does a hip adduction moment mean for my patients?" Such questions, asked of me during my early career by patients and providers alike, continue to motivate my osteoarthritis biomechanics research. My lab studies osteoarthritis from disease initiation through arthroplasty and beyond. In this talk, I will discuss our shift from simply characterizing gait mechanics at these stages, to examining the associations of gait mechanics and outcomes, towards our ultimate goal of using biomechanically-based interventions to improve outcomes. The specific outcomes we currently study range from physical activity and falls to clinical outcomes of joint replacement. I will describe our progress in answering our early motivating questions and our progress in transforming our approaches from being disease-oriented or implant-oriented to being patient-oriented.

Kharma Foucher, *Associate Professor, Department of Kinesiology and Nutrition, University of Illinois at Chicago*

AWARD WINNERS

ASB AWARDS

BORELLI AWARD

Thomas S. Buchanan, *University of Delaware*

Borelli Award Talk

August 23rd 9:15-10:15

This is the most prestigious honor given by the ASB. The award recognizes outstanding career accomplishment and is awarded annually to an investigator who has conducted exemplary research in any area of biomechanics.

Thomas S. Buchanan is the George W. Laird Professor of Mechanical Engineering, Biomedical Engineering, and Biomechanics & Movement Science at the University of Delaware and is an expert in neuromuscular biomechanics. His training was at UCSD (BS in Applied Mechanics & Engineering Sciences, in1980), Northwestern University (MS in Biomedical Engineering in 1982, PhD in Theoretical & Applied Mechanics, in 1986) and University of Balamand (MTh in Applied Orthodox Theology in 2020). He did post-doctoral training in brain sciences at MIT and neurophysiology at Northwestern/Rehabilitation Institute of Chicago before taking a faculty position at Northwestern/RIC in Physical Medicine & Rehabilitation. He was later recruited to the University of Delaware where he became Director of the Center for Biomedical Engineering Research. Over his years at UD, he has served as leader of all three academic units in which he has faculty appointments. Buchanan has served as editor-in-chief of the Journal of Applied Biomechanics and President of the American Society of Biomechanics. He holds the rank of Fellow in the American Society of Mechanical Engineers (ASME), American Institute of Medical and Biological Engineering (AIMBE), the American College of Sports Medicine (ACSM) and the American Society of Biomechanics (ASB). He has served as PI of NIH grants every year since 1990, including a large center grant on FES and Biomechanics: Treating Movement Disorders and a 15-year NIH Center for Biomedical Research Excellence (COBRE) award on Osteoarthritis: Prevention and Treatment. His research focuses on the neural control of joint stability and musculoskeletal models of muscle and joint forces with applications to osteoarthritis, stroke and sports medicine. His work uses EMG-driven models to estimate muscle forces and medical imaging (MRI and ultrasound) to quantify muscle and tendon morphology as well as cartilage health.

JIM HAY MEMORIAL AWARD

Matt Nurse, *Nike*

Hay Award Symposium

August 24th 9:15-10:15

The Jim Hay Memorial Award recognizes originality, quality, and depth of biomechanics research that address fundamental research questions relevant to the extraordinary demands imposed in sport and exercise.

Matthew Nurse is the Vice-President of the Nike Sport Research Lab (NSRL) for NIKE, Inc. Nurse leads a multi-disciplinary team of researchers, scientists, and innovators focusing on biomechanics, human physiology, sensory perception, neuroscience, performance training, and data science.

The NSRL creates the foundation for innovation with a relentless pursuit of data driven truths and insights that solve real problems, improves performance, and impacts human behavior. They translate insights into opportunities to make people move and feel better – not just for elite level athletes, but for all athletes*. In partnership with the broader teams across NXT Footwear, Apparel, and Digital Innovation, the NSRL helps bring disruptive products, platforms, and capabilities to market.

Nurse has been at Nike with the Research and Innovation team for almost twenty years. In that time, he has previously worked as a Principal Researcher for the Basketball, Golf, and Equipment categories. He has also worked on numerous advanced product concepts that have led to more than a dozen patents related to footwear, apparel, and digital product applications.

Most recently, he helped oversee the design and launch of the NSRL in the new Lebron James Innovation Center. Housing one of the most sophisticated sport science and athlete* service centers, the NSRL positions Nike for future decades of game-changing products and experiences for all athletes. These advancements support an expansion of research and development that encompasses both mental and physical well-being.

Nurse earned his Ph.D. in Biomechanics & Medical Science while working in the Human Performance Lab at the University of Calgary, Canada. His prior work focused on topics ranging from role of afferent feedback on the control of locomotion, to researching the effects of footwear and shoe inserts on performance and mobility.

FOUNDERS' AWARD

Brian Umberger, *University of Michigan*

Award Session Presentation

August 24th 10:45 – 12:15

The Founders' Award was established in 2017 to recognize scientific accomplishment in biomechanics and excellence in mentoring and is open to investigators of all disciplines within ASB.

Brian Umberger, Ph.D., is Professor of Movement Science and Chair of the Movement Science Program in the School of Kinesiology at the University of Michigan. At Michigan, he holds additional appointments in the Robotics Department and the Institute for Computational Discovery and Engineering. Dr. Umberger received the B.S. degree from Central Connecticut State University (1993), the M.S. degree from Springfield College (1997), and the Ph.D. degree from Arizona State University (2003). Prior to moving to the University of Michigan in 2018, Dr. Umberger was a faculty member at the University of Kentucky (2003-2006) and the University of Massachusetts, Amherst (2006-2018).

Dr. Umberger has been an active member of ASB for nearly 25 years, having first joined the Society as a graduate student. He has served ASB as an abstract reviewer, session moderator, panelist, program committee member, mentoring program participant, and most notably as Program Chair (2014) and President (2018-2019). In addition to ASB, Dr. Umberger is a member of the International Society of Biomechanics, the American College of Sports Medicine, and the American Association for the Advancement of Science. He has served as an associate editor for Medicine and Science in Sports and Exercise, as a guest editor for Journal of Biomechanics, and he is on the editorial board for the Journal of Applied Biomechanics.

Dr. Umberger's research program is focused on better understanding the mechanics, energetics, and control of bipedal locomotion. He studies fundamental and clinical aspects of locomotion in humans and other bipeds, using a combination of experimental and computer modeling techniques. The topics Dr. Umberger has studied have ranged from clinical gait disorders and assistive devices to the origins of human bipedalism, and have involved collaborations with physical therapists, physicians, engineers, anatomists, and anthropologists. His research has been funded by the National Science Foundation, the National Institutes of Health, and several charitable foundations. Dr. Umberger's favorite part of being a scientist working in the field of biomechanics is the people; specifically, the students, postdocs, industry partners, early career researchers, mid-career peers, and senior colleagues he has the pleasure of knowing and working with.

JEAN LANDA PYTEL AWARD FOR DIVERSITY MENTORSHIP IN BIOMECHANICS

Brian Davis, *Cleveland State University*

Award Session Presentation

August 24th 10:45 – 12:15

The Jean Landa Pytel Diversity Mentoring Award, started 2019, recognizes the long-term impact of mentoring on both the careers of individual scientists, including women and individuals from other traditionally under-represented backgrounds in ASB, and the ultimate betterment of our society as a whole.

Dr. Brian Davis, is a former President of the International Society of Biomechanics, Vice Chairman of Biomedical Engineering at The Cleveland Clinic and currently Associate Dean of the Washkewicz College of Engineering at Cleveland State University. He has been an ASB member for over 15 years and was Co-Chair of the combined 2005 meetings of the ISB and ASB held in Cleveland. His biomechanics research started at the University of Cape Town in South Africa (under the supervision of Dr. Kit Vaughan) and continued as a doctoral student at Penn State University (with Dr. Peter Cavanagh as his advisor). Broad speaking, his research encompasses gait analysis, orthopaedic biomechanics and biomedical instrumentation.

Aside from biomechanics research, his passion is to reach out to individuals who are not aware of opportunities in STEM fields. In this respect he has previously been funded for initiatives related to promoting science and engineering amongst populations who may not be familiar with ASB:

PI on a 3-year project funded by the NIH, "CCF Science and Education Initiative" involving students from inner-city schools who participated in summer camps and who had one-on-one mentoring by scientists at The Cleveland Clinic.

PI on a 4-year project funded by the Howard Hughes Medical Institute, "A Science and Research Initiative for Pre-College students" also enabling under-represented high school students to have one-on-one mentoring.

Co-PI on a project funded by the National Science Foundation (NSF), "Science in the Circle: Integrating Arts and Humanities into Authentic Science Experiences". This project leveraged the rich diversity of arts and sciences resources within NE Ohio to engage Cleveland public school students in authentic, multidisciplinary science experiences.

Team lead on an initiative to set up a gait laboratory in Tanzania on the slopes of Mount Kilimanjaro.

Creator of the "Bridging Engineering Science and Technology in Medicine" Engineering fair. This annual event was created in 2011, and showcases students in grades 6 through 12 who have completed projects at the interface between engineering and medicine.

PI on a NSF-funded conference to create a national alliance to reach out to under-represented students in biomechanics, biomaterials and biomedical engineering.

He is currently funded by the Engineering Information Foundation and Hyland Software Inc. to reach out to under-represented and female K-12 students who have interests in STEM.

GOEL AWARD FOR TRANSLATIONAL RESEARCH IN BIOMECHANICS

Richard Lieber, *Shirley Ryan AbilityLab*

Award Session Presentation

August 24th 10:45 – 12:15

The Goel Award, newly created in 2016, recognizes outstanding accomplishments in translational biomechanics research, entrepreneurship, and societal benefit

Rick Lieber is a physiologist who earned his Ph.D. in Biophysics from U.C. Davis developing a theory of light diffraction that was applied to mechanical studies of single muscle cells. He joined the faculty at the University of California, San Diego in 1985 where he spent the first 30+ years of his academic career, achieving the rank of Professor and Vice-Chair of the Department of Orthopaedic Surgery. He received the M.B.A. in 2013 and is currently Chief Scientific Officer and Senior Vice President at the Shirley Ryan AbilityLab and Professor of Physical Medicine & Rehabilitation and Biomedical Engineering at Northwestern University in Chicago, IL.

Dr. Lieber's work in intentionally translational, applying basic scientific principles to help patients who have experienced spinal cord injury, stroke, musculoskeletal trauma or cerebral palsy. He has published over 300 articles in journals ranging from the very basic such as Biophysical Journal and The Journal of Cell Biology to clinical journals such as The Journal of Hand Surgery and Clinical Orthopaedics and Related Research. Dr. Lieber's research focuses on design and plasticity of skeletal muscle. Currently, he is developing state-of-the-art biological and biophysical approaches to understanding muscle contractures that result from cerebral palsy, stroke and spinal cord injury.

ASB EARLY CAREER ACHIEVEMENT AWARD

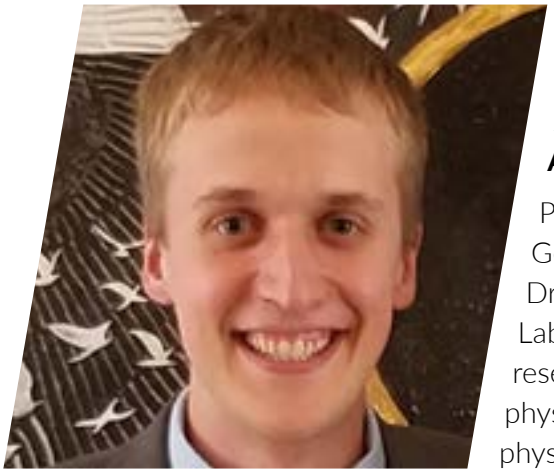
Amy Lenz, *University of Utah*

Awards Session Presentation

August 22nd 10:45 – 12:15

Dr. Amy Lenz is a Research Instructor in the Department of Orthopaedics at the University of Utah. She received her BS in Biomedical Engineering from the University of Wisconsin-Madison, her MS in Mechanical Engineering from the University of Delaware, and her PhD in Engineering Mechanics from Michigan State University. Her current work studies foot and ankle orthopaedic biomechanics with a focus on characterizing healthy, diseased, and post-surgical foot and ankle morphology and in-vivo function to improve clinical treatment of ankle pathologies. Her expertise is in medical imaging, human biomechanics, and statistical shape modeling to integrate experimental and computational research to define relationships between 3D anatomy and dynamic movement.

ASB PRE-DOCTORAL ACHIEVEMENT AWARD



Pawel Golyski, *Georgia Institute of Technology*

Awards Session Presentation

August 22nd 10:45 – 12:15

Pawel Golyski is a 5th year PhD candidate in Bioengineering at the Georgia Institute of Technology in Atlanta, Georgia. He is advised by Dr. Gregory Sawicki, PI of the Physiology of Wearable Robotics (PoWeR) Lab. With the support of an NSF Graduate Research Fellowship, Pawel's research investigates the interactions between wearable robots, muscle physiology, and locomotor stability. Pawel's long-term goal is to develop physiologically informed devices and interventions that improve stability for individuals with lower limb injury. Before starting graduate school, Pawel was a research engineer at Walter Reed National Military Medical Center. Pawel holds a BS in Biomedical Engineering from Brown University.

ASB JUNIOR FACULTY RESEARCH AWARD

Gu Eon Kang, *The University of Texas at Dallas*

"Assessing gait in stroke survivors with an implanted vagus nerve stimulation device"

More than 70% of people who survive a stroke sustain some feature of gait impairment post- stroke, resulting in increased risk of falls in stroke survivors. Conventional therapies to treat gait impairment such as ankle-foot orthosis and functional electrical stimulation has limited effectiveness, and a novel therapy is urgently needed. A highly interdisciplinary team of neuroscientists, bioengineers, and clinicians at The Texas Biomedical Device Center at The University of Texas at Dallas, and Baylor Scott and White Research Institute have developed and tested a wirelessly controlled vagus nerve stimulator that is safely implanted in the human body. In this ASB Junior Faculty Research Award funded study, I will assess gait in stroke survivors with an implanted vagus nerve stimulation device. If successful, this proposed study will generate preliminary data for a large grant submission to conduct a randomized controlled trial to rigorously test therapeutic effects of vagus nerve stimulation on gait in stroke survivors.

RESEARCH TRAVEL GRANT

Robert Catena, *Washington State University*

Hominin sexual dimorphisms must have evolved to balance gestation (for species survival) and bipedalism. This research line will explore how pregnancy shaped hominin evolution, which will inform current clinical questions in an evolutionary medicine framework. The objectives during this travel award are to develop, validate, and test gestational musculoskeletal modeling and simulation methods. This will allow us to explore how gradual changes over the past 7 million years affected the biomechanics of bipedal gait and current female health issues, and lead to determining why the hominin spine and pelvis became more sexually dimorphic as other traits became less sexually dimorphic compared to other great apes. Musculoskeletal simulations will allow us to draw conclusions about the evolutionary effect on current medical issues that disproportionately affect females. This fits with my long-term research goals to understand susceptibility to musculoskeletal disorders during pregnancy and long-term orthopedic issues for parous females. I will use this ASB research travel award to help with the travel costs during my upcoming sabbatical. In Fall of '22, I will start my sabbatical working with Dennis Anderson at Beth Israel Deaconess Medical Center, an expert in thoracolumbar modeling. We will develop an OpenSim human female trunk/lower extremity musculoskeletal model set accounting for the many gestational changes in muscle, posture, and inertial parameters. Then in Spring of '23, I will be working with Brian Umberger at University

of Michigan, an expert in hominid modeling and dynamic optimization. We will explore dynamic optimization for pregnant human gait. We will then scale gestational gait models to represent extinct hominin ancestors. I look forward to building this collaboration, making our models freely available to others, and sharing our findings at future ASB meetings.

UP AND COMER AWARDS

The "Up and Comer" Award, sponsored by the ASB Council of Fellows, is intended to foster mentoring and networking of post-doctoral trainees and early career faculty with ASB Fellows of similar research interests.

Christopher Nagelli, *Mayo Clinic*

Fellow mentor: **Ted Gross**

Manuel Enrique Hernandez, *University of Illinois Urbana-Champaign*

Fellow mentor: **Jill McNitt-Gray**

MEETING AWARDS

At each Annual Meeting, ASB honors excellence in research presented at the meeting. Individual meeting awards are selected based on the quality of the abstract submissions and oral presentations (Journal of Biomechanics and Clinical Biomechanics Awards).

Awards Session Presentation

August 23rd 10:45 – 12:15

CLINICAL BIOMECHANICS AWARD FINALISTS

Recognizes outstanding new biomechanics research targeting a contemporary clinical problem.

Characterization of elbow flexion recovery following surgery for traumatic brachial plexus injury

Eric J. Noonan, Sandesh G. Bhat, Griffin Mess, Emily Miller, Paul Kane, Alexander Y. Shin, Kenton R. Kaufman

Patellofemoral knee mechanics 3 months after acl reconstruction are associated with markers of patellofemoral cartilage degradation 24 months after surgery

Jack R. Williams, Kelsey Neal, Abdulmajeed Alfayyadh, Jacob J. Capin, Ashutosh Khandha, Kurt Manal, Lynn Snyder-Mackler, Thomas S. Buchanan

JOURNAL OF BIOMECHANICS FINALISTS

Recognizes substantive and conceptually novel mechanics approaches explaining how biological systems function.

Shear wave tensiometry predictions of Achilles tendon force during running

Alex J. Reiter, Jack A. Martin, Keith A. Knurr, Darryl G. Thelen

Direct intraoperative length-tension measurements of human gracilis muscle

Benjamin I. Binder-Markey, Lomas S. Persad, Alexander Y. Shin, William Litchy, Kenton R. Kaufman, Richard L. Lieber

TRAVEL AWARDS

Bradley Moore, *Northwestern University and Jesse Brown Veterans Affairs Medical Center*
Yu Song, *University of Wyoming*
Amanda Munsch, *University of North Carolina at Chapel Hill and North Carolina State University*
Andrew Shelton, *University of North Carolina at Chapel Hill*
Seth Higgins, *Oakland University*
Morgan Dalman, *North Carolina State University*
Whitney Wolff, *University of Michigan*
Haneol Kim, *Georgia State University*
Harper Stewart, *University of Southern California*
Grace Kellaher, *University of Delaware*
Lauren Luginsland, *Old Dominion University*
Pawel Golyski, *Georgia Institute of Technology*
Sarah Barron, *University of Florida*
Hannah Carey, *West Virginia University*
Blake Jones, *East Carolina University*
Jennifer Leestma, *Georgia Institute of Technology*

B-SURE PROGRAM RECIPIENTS

Destinee Webster, *Georgia State University*
Joshua Cayme, *University of Texas El Paso*
Zachary White, *Georgia Institute of Technology*
Janai Augustin, *City College of New York*
Alexie Hernandez, *Stevenson University*

GRADE INITIATIVE RECIPIENTS

International Women in Biomechanics ❐
Latinx in Biomechanix ❐
Black Biomechanists Association ❐

CSB/SCB CAREER AWARD WINNER

Dr. Kevin Deluzio

Dr. Kevin Deluzio is a Professor and Dean of the Faculty of Engineering and Applied Science at Queen's University. Dr. Deluzio is a pillar within Canada's biomechanics community and has been an active member of the CSB/SCB since 1994, holding numerous roles including executive positions and conference co-chair. He has established 2 highly productive human movement labs at Dalhousie University and Queen's University, and has made significant contributions to fundamental principles and application of human movement data acquisition and dynamic and statistical modeling. He has made substantial advancements in the clinical application of biomechanics to orthopaedics, and his expertise has led to pioneering research using novel markerless motion capture protocols. His research program has been supported by more than ten million dollars in funding, and his output has included 77 peer-reviewed publications, 2 book chapters, and 175 conference paper contributions to the biomechanics literature, in addition to numerous invited talks and industry contracts. His commitment to training and capacity building in Canadian biomechanics has been outstanding and is one of his greatest contributions to our field. He has supervised 8 PhD, 20 Master's, 53 undergrad students and 5 postdocs, with great training and advising contributions across the country. Six of his PhD graduates are now faculty members at Canadian institutions in biomechanics-related fields across the country, with most continuing his legacy of contribution to CSB/SCB and the national community. Dr. Deluzio's approach to mentoring and training is built on unwavering principles of inclusivity and respect. He has been awarded teaching excellence awards at the department and faculty levels. Dr. Deluzio has also made many contributions to other professional societies, including being a past president of the Canadian Orthopaedic Research Society, and the current Chair of Engineering Deans Canada.

CSB/SCB DAVID WINTER EARLY CAREER AWARD WINNER

Dr. Diana De Carvalho

Dr. Diana De Carvalho has been an active member of the CSB/SBC since 2006 and was fortunate to be in the last cohort of graduate students taught by Dr. David Winter at the University of Waterloo. She graduated with her PhD in 2015, which coincided with her first faculty appointment at Memorial University of Newfoundland in St. John's Canada. During this time, Diana has successfully developed a highly productive research program, and the first biomechanics laboratory, in the Faculty of Medicine. Her research is centred on spine biomechanics, ergonomics, and clinical low back pain and she has a particular interest in the effect sustained flexed postures, such as sitting, have on the mechanics of the back. In this early career period Diana attracted over a half a million dollars in research funding as principal investigator, trained 6 graduate students, published over 25 manuscripts (11 directly from her lab), and was recognized by a number of awards and recognitions including 1st place in the Louis Sportelli Research Awards (15th Biennial Congress of the World Chiropractic Federation, 2019). Her work, especially in the area of sitting-related back pain, has been translated through 12 local and national media interviews and has been cited over 450 times.

WORKSHOPS AND TUTORIALS

NACOB Workshops and Tutorials are open to all registered delegates of the conference. Pre-registration is required and can be added at the registration desk or in advance during registration.

8:00am – 12:00pm

Room 213/215

Diversifying Your Workplace

Kayla Seymore[1], Kat Daniels[2], Alexa Johnson[3], Andrew Mitchell[4], Jonaz Moreno[5], Erica Bell[6], Matthew McCullough[7]

[1]University of Delaware, [2]Manchester Metropolitan University, [3]University of Michigan, [4]University of Bedfordshire, [5]University of Massachusetts Amherst, [6]Mayo Clinic, [7]North Carolina A&T State University

As professionals in the field of biomechanics, it's critical to consider the broader impact of our work and presence within society. One way to continually make a positive impact for biomechanists of diverse backgrounds is to reduce barriers to diversity, equity, and inclusion (DEI). There have been many discussions about the type of DEI work that should be done to improve inclusion within the field of biomechanics. In a post-workshop survey on cultural competency hosted by the Black Biomechanists Association (BBA) at the American Society of Biomechanics (ASB) 2021 meeting, all attendees expressed support for DEI initiatives. However, the majority also described barriers to the effective incorporation of these DEI initiatives in their workplace. Building on our previous workshop, this proposed workshop will provide practical actions that can be taken to reduce barriers to sustainable DEI initiatives in biomechanics, while providing space for open discussion and self-reflection. Facilitators will offer tools and resources to help you effectively promote and enact DEI in your own workplace. Ultimately, this workshop will instill confidence in attendees to make changes towards more diverse, inclusive, and equitable workplace environments that improve the field of biomechanics. The workshop will be offered in collaboration with Latinx in Biomechanix (LiB) and International Women in Biomechanics (IWB).

Room 214

Multifractal Methods for Movement Science

Aaron Likens[1], Anaelle Charles[2]

[1]UNO, [2]University of Nebraska at Omaha

In movement science, time series data are often noisy. For example, spatiotemporal parameters measured while locomoting or maintaining upright posture often vary considerably over several minutes of observation. Traditional linear statistics such as the mean and standard deviation often fail to capture these time varying properties. A key feature of biological signals such as heart rate, neural activity, and human walking is that they entail coordination across many timescales. These scales range from milliseconds important in neuroscience to the multiple minutes that make up bouts of walking. Thus, analytical methods are required to address the multiscale nature of human movement and physiological data. One class of methods, collectively known as multifractal analysis, is naturally suited to this task.

This workshop will introduce fractal theory and its relevance to the control of human movements and physiology. In addition, workshop attendees will be provided hands-on instruction in applying multifractal methods to human movement data with MATLAB. The hands-on instruction will also include details on best practices. Upon workshop completion, participants will acquire (1) a deeper understanding of the underlying mathematics and theory on multifractality in movement science, (2) software for performing analyses on their own data, and (3) knowledge on best practices for multifractal analysis in research. Workshop attendees are strongly encouraged to bring their own data to maximize learning during the workshop; however, example datasets will also be provided. The only prerequisites are college level algebra and a basic proficiency with MATLAB. Participants of all backgrounds including researchers, clinicians, and students of all levels are encouraged to attend.

1:00pm – 3:00pm

Room 214

Canadian and United States Federal Funding for Biomechanics Research

Jennifer Jackson[1], Linda McKenzie[2], Marie Claude Caron[3], Mohamad Nasser-Eddine[4], Toyin Ajisafe[5], Laurel Kuxhaus[6], Brian Schulz[7], Akua Roach[8]

[1]National Institutes of Health, [2]Canadian Institutes of Health Research, [3]Natural Sciences and Engineering Research Council of Canada, [4]Canada Foundation for Innovation, [5]National Institutes of Health / National Center for Medical Rehabilitation Research, [6]National Science Foundation, [7]Veterans Health Administration, [8]Department of Defense / Congressionally Directed Medical Research Programs

The Canadian and United States (U.S.) federal governments fund biomechanics research and have many available funding opportunities across multiple agencies. This workshop will include several funding agency representatives from Canada (Canadian Institutes of Health Research (CIHR), Natural Sciences and Engineering Research Council of Canada (NSERC), and Canada Foundation for Innovation (CFI)) and the United States (National Institutes of Health (NIH), National Science Foundation (NSF), Veterans Health Administration (VHA), U.S. Army Medical Research and Development Command (USamRDC)). They will present current information on research programs and initiatives, training and career development opportunities, and application and review processes. Differences between governments/agencies will be highlighted. Federal representatives attend conferences like NACOB to keep abreast of cutting-edge science, meet with attendees, disseminate funding opportunities, and answer applicant or grantee questions. Some federal representatives may be able to connect people performing similar research or addressing related research questions from different avenues to facilitate new collaborations. Attendees will have opportunities during the conference to reach out to these individuals with further questions. After presentations by a designated speaker from each agency, there will be open Q&A for all panelists. Handouts and contact information will be provided. This workshop is appropriate for researchers of all career stages, from trainees to senior investigators. Participants will gain a greater understanding of the Canadian and U.S. federal funding application and review processes, as well the similarities and differences between the respective funding agencies.

3:00pm – 5:00pm

Room 213/215

Keys to Successful Outreach Programs

Lisa MacFadden[1], Paul DeVita[2], Erica Bell[3], Kimberly Bigelow[4], Antonia Zaferiou[5], Scott Monfort[6]

[1]Sanford Health, [2]East Carolina University, [3]Mayo Clinic, [4]University of Dayton, [5]Stevens Institute of Technology, [6]Montana State University

This workshop will help attendees create successful National Biomechanics Day outreach programs and to evaluate the educational outcomes of the programs. Specifically, we will address

1/ Philosophy, purpose, and value of biomechanics outreach including unifying outreach across the field of biomechanics
2/ Mechanisms and procedures for successful, sustained universal outreach
3/ Diversifying biomechanics science through outreach
4/ Educational outcome assessment and publication
5/ Broadening biomechanics science dance biomechanics

Room 214

A Clinical Trials Tutorial for Biomechanists

Stephen P Messier[1], Monica Maly[2]

[1]Wake Forest University, [2]University of Waterloo

According to the hierarchy of evidence for the evaluation of health care outcomes, the best way for seeking the truth is with randomized clinical trials. They are considered the gold standard because they deliver the highest level of evidence, due to their potential to limit bias. This tutorial will discuss why it is important for biomechanists to be involved in randomized clinical trials and provide the basics of randomized clinical trials design by weaving these fundamentals into the multidisciplinary study of non-surgical interventions to treat knee osteoarthritis. The tutorial will conclude with a discussion of NIH funding mechanisms that lead to the submission of a randomized clinical trial and the importance of building a multidisciplinary research team.

DETAILED PROGRAM

All sessions will be held in the Shaw Centre, 2nd floor unless otherwise indicated

DAY 1 Sunday August 21, 2022

WORKSHOPS AND TUTORIALS

8:00am – 12:00pm

Rooms 213/215

Diversifying Your Workplace

Kayla Seymore[1], Kat Daniels[2], Alexa Johnson[3], Andrew Mitchell[4], Jonaz Moreno[5], Erica Bell[6], Matthew McCullough[7]

[1]University of Delaware, [2]Manchester Metropolitan University, [3]University of Michigan, [4]University of Bedfordshire, [5]University of Massachusetts Amherst, [6]Mayo Clinic, [7]North Carolina A&T State University

Room 214

Multifractal Methods for Movement Science

Aaron Likens[1], Anaelle Charles[2]

[1]UNO, [2]University of Nebraska at Omaha

1:00pm – 3:00pm

Room 214

Canadian and United States Federal Funding for Biomechanics Research

Jennifer Jackson[1], Linda McKenzie[2], Marie Claude Caron[3], Mohamad Nasser-Eddine[4], Toyin Ajisafe[5], Laurel Kuxhaus[6], Brian Schulz[7], Akua Roach[8]

[1]National Institutes of Health, [2]Canadian Institutes of Health Research, [3]Natural Sciences and Engineering Research Council of Canada, [4]Canada Foundation for Innovation, [5]National Institutes of Health / National Center for Medical Rehabilitation Research, [6]National Science Foundation, [7]Veterans Health Administration, [8]Department of Defense / Congressionally Directed Medical Research Programs

3:00pm – 5:00pm

Rooms 213/215

Keys to Successful Outreach Programs

Lisa MacFadden[1], Paul DeVita[2], Erica Bell[3], Kimberly Bigelow[4], Antonia Zaferiou[5], Scott Monfort[6]

[1]Sanford Health, [2]East Carolina University, [3]Mayo Clinic, [4]University of Dayton, [5]Stevens Institute of Technology, [6]Montana State University

Room 214

A Clinical Trials Tutorial for Biomechanists

Stephen P Messier[1], Monica Maly2

[1]Wake Forest University,2University of Waterloo

7:00pm – 10:00pm

Sens House at the Byward Market

NETWORKING EVENT

Stop by the Sens House to catch up with old colleagues, meet new friends and relax in this unique Ottawa pub!

This event is a come and go event with no scheduled activities.

DAY 2 Monday August 22, 2022

7:45am – 8:00am
Gatineau Salon

OPENING REMARKS

Join us to hear from the conference co-chairs, Daniel Benoit and Ryan Graham, University of Ottawa and to officially begin NACOB 2022!

8:00am – 9:00am
Gatineau Salon

KEYNOTE LECTURE 1

Increasing our ROI in science: Start with better behavior

David Moher, *Ottawa Hospital Research Institute*

9:15am – 10:15am
Gatineau Salon

CSB CAREER AWARD

Moderators: **Janie Astephen Wilson**, *Dalhousie University &*
Scott Landry, *Acadia University*

Dr Kevin Deluzio, *Queen's University*

10:15am – 10:45am
Foyer

BREAK

10:45am – 12:15pm
Gatineau Salon

PREAWARDED SESSION

Moderators: **Dennis Anderson**, *Harvard University &*
Andrew Laing, *University of Waterloo*

ASB PRE-DOCTORAL ACHIEVEMENT AWARD

Pawel Golyski, *Georgia Institute of Technology*

ASB EARLY CAREER ACHIEVEMENT AWARD

Amy Lenz, *University of Utah*

CSB DAVID WINTER EARLY CAREER AWARD

Diane De Carvalho, *Memorial University of Newfoundland*

12:15pm – 1:30pm
Foyer

LUNCH

Grab a lunch box, visit an exhibitor, explore the outside!
sponsored by **Vicon**

Room 214

DIVERSITY LUNCH

Grab a lunch box and join us to hear about how you can help diversify the biomechanics field.

Room 215

MENTORSHIP LUNCH

Meet with your mentor over a casual boxed lunch. Room 215 is available as a location should you wish to meet in a meeting room but mentor pairs are welcome to meet in a location of their convenience.

1:30pm – 3:00pm
Room 205/206

SESSION 1

S1 - Skeletal muscle scaling: fundamental knowledge to modeling and clinical application

Richard Lieber[1], Walter Herzog[2], Benjamin Binder-Markey[3], Stephanie Ross[4], Silvia Blemker[5]

[1]Shirley Ryan AbilityLab, [2]University of Calgary, [3]University of Guelph, [4]University of British Columbia, [5]University of Virginia

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Room 207/208

O1.1 – ASSISTIVE TECHNOLOGIES AND ROBOTICS

Session Moderator: **Elisa Arch**, *University of Delaware &*
Luke Nigro, *University of Delaware*

1:30pm - 1:42pm

O1.1.1 - Elastic exoskeletons may not offload the triceps surae as expected

Dylan Schmitz[1], Sara Harper[1], Darryl Thelen[1]

[1]University of Wisconsin

1:43pm - 1:55pm

O1.1.2 - Exoskeletons need to react faster than reflexes to improve standing balance

Owen Beck[1], Max Shepherd[2], Rish Rastogi[1], Lena Ting[1], Gregory Sawicki[3]

[1]Emory University, [2]Northeastern University, [3]Georgia Institute of Technology

1:56pm - 2:08pm

O1.1.3 - Overground optimization of ankle exoskeleton assistance for self-selected walking speed

Benjamin Shafer[1], Aaron Young[1], Gregory Sawicki[1]

[1]Georgia Institute of Technology

2:09pm - 2:21pm

O1.1.4 - Active exosuit controller to reduce back exertion while minimizing restriction

D. Adam Quirk[1], Jinwon Chung[1], Conor Walsh[1]

[1]Harvard University

2:22pm - 2:34pm

O1.1.5 - Walking speed estimation using a single imu sensor for a wearable robot application

Prakyath Kantharaju[1], Meet Mevada[1], Siddarth Vakacharla[1], Courtney Haynes[2], Courtney Bradford[2], Myunghee Kim[1]

[1]University of Illinois at Chicago, [2]U.S. ARMY DEVCOM Army Research Laboratory

2:35pm - 2:47pm

O1.1.6 - Musculoskeletal models predict the effect of a soft active exosuit on spinal muscle activations during lifting

Chenxi Yan[1], Jacob Banks[1], Brett Allaire[1], David Quirk[2], Jinwon Chung[2], Conor Walsh[2], Dennis Anderson[1]

[1]BIDMC / Harvard Medical School, [2]Harvard University

2:48pm - 3:00pm

O1.1.7 - How do exoskeletons influence muscle spindle feedback

Amro Alshareef[1], Jake Stephens[1], Lena Ting[2], Gregory Sawicki[1]
[1]Georgia Institute of Technology, [2]Emory University

Room 203

O1.2 – IMAGING 1 - BONE

Session Moderator: Amy Lenz, *University of Utah &* Sarah Manske, *University of Calgary*

1:30pm - 1:42pm

O1.2.1 - Interosseus Proximity Distributions as 4DCT-derived Carpal Arthrokinematic Biomarkers

Taylor Trentadue[1], Cesar Lopez[1], Ryan Breighner[2], David Holmes[1], Sanjeev Kakar[1], Shuai Leng[1], Steven Moran[1], Andrew Thoreson[1], Kristin Zhao[1]
[1]Mayo Clinic, [2]Hospital for Special Surgery

1:43pm - 1:55pm

O1.2.2 - Super-Resolution 3-D Reconstruction for Creating Bone Models from Low-Resolution Clinical CT

Rebecca Abbott[1], Ryan Breighner[2], Arin Ellingson[1]
[1]University of Minnesota, [2]Hospital for Special Surgery

1:56pm - 2:08pm

O1.2.3 - Imaging characteristics of a weight-bearing, cone beam computed tomography system

Tadiwa Waungana[1], Ying Zhu[1], Sarah Manske[1]
[1]University of Calgary

2:09pm - 2:21pm

O1.2.4 - Automated Semantic Segmentation Of Carpal Bones From 4DCT Image Volumes

Taylor Trentadue[1], Abhinav Goyal[1], Andrew Thoreson[1], Ryan Breighner[2], David Holmes[1], Kristin Zhao[1]
[1]Mayo Clinic, [2]Hospital for Special Surgery

2:22pm - 2:34pm

O1.2.5 - Reproducibility and repeatability of a semi-automated pipeline to quantify trapeziometacarpal joint angles using dynamic computed tomography

Michael Kuczynski[1], Kendra Wang[2], Justin Tse[1], Tomasz Bugajski[1], Sarah Manske[1]
[1]University of Calgary, [2]University of Waterloo

2:35pm - 2:47pm

O1.2.6 - Does a cylinder fit to the talar dome capture the functional axis of the talocrural joint?

Anja-Verena Behling[1], Luke Kelly[1], Lauren Welte[2], Michael Rainbow[3]
[1]University of Queensland, [2]University of Wisconsin, [3]Queen's University

2:48pm - 3:00pm

O1.2.7 - Carpal tunnel morphology quantification using a centroid-to-boundary distance one-dimensional shape signature

Drew Anderson[1], Michele Oliver[1], Karen Gordon[1]
[1]University of Guelph

Room 215

O1.3 – METABOLICS/ENERGETICS OF LOCOMOTION

Session Moderator: **Brian Umberger**, *University of Michigan &*
Jessica Selinger, *Queen's University*

1:30pm - 1:42pm

O1.3.1 - Increasing Kinematic Fidelity Improves Predictions of Walking Metabolic Cost

Ricky Pimentel[1], Adam Kiefer[1], Jason Franz[1]
[1]*University of North Carolina*

1:43pm - 1:55pm

O1.3.2 - A simple model of bipedal walking predicts energy-optimal gait on a split-belt treadmill

Surabhi Simha[1], Sina Mehdizadeh[2], Max Donelan[2]
[1]*Simon Fraser University; Emory University & GeorgiaTech,* [2]*Simon Fraser University*

1:56pm - 2:08pm

O1.3.3 - Walking metabolic cost increases when synchronizing steps to unstructured visual cues

Anaelle Charles[1], Nicholas Stergiou[1], Aaron Likens[1]
[1]*University of Nebraska*

2:09pm - 2:21pm

O1.3.4 - A reduced model to explain variation in running economy with biomechanics

Kate Harrison[1], Kate Harrison[1], Bradley Davidson[2], Eric Honert[1], Daniel Feeney[1]
[1]*BOA Technology,* [2]*University of Denver*

2:22pm - 2:34pm

O1.3.5 - Why is the metabolic cost of locomotion higher on sand?

Jonathan Gosyne[1], Gregory Sawicki[1]
[1]*Georgia Institute of Technology*

2:35pm - 2:47pm

O1.3.6 - Effects of real-time visual feedback on metabolic power during walking in people with transtibial amputation

Caelyn Hirschman[1], Janet Zhang[1], Alena Grabowski[1]
[1]*University of Colorado*

2:48pm - 3:00pm

O1.3.7 - Mechanical energy cost optimisation of obstacle negotiation manoeuvres

Katherine Daniels[1], J Burn[2]
[1]*Manchester Metropolitan University,* [2]*University of Bristol*

Room 201

O1.4 – MILITARY AND VETERAN'S HEALTH

Session Moderator: **Pinata Sessoms**, *Naval Health Research Center*

1:30pm - 1:42pm

O1.4.1 - The Effect of Bone-Anchored Prosthesis Use on Biomechanical Factors Associated with Knee Osteoarthritis: A Preliminary Analysis

Clare Severe[1], Brad Hendershot[1], Christopher Dearth[1], Benjamin Potter[1], Jonathan Forsberg[1]

[1]Walter Reed National Military Medical Center

1:43pm - 1:55pm

O1.4.2 - Elbow loading due to back face deformation of ballistic shields

Julia de Lange[1], Liam Burrows[1], Jean-Sébastien Binette[2], Cheryl Quenneville[1]

[1]McMaster University, [2]Defence Research and Development Canada

1:56pm - 2:08pm

O1.4.3 - Trunk and pelvis movement in sloped walking for servicemembers with a transfemoral osseointegrated prosthesis

Jonathan Gladish[1], Julian Acasio[1], Brad Hendershot[1], Christopher Dearth[1], Benjamin Potter[1], Jonathan Forsberg[1]

[1]Walter Reed National Military Medical Center

2:09pm - 2:21pm

O1.4.4 - Effect of fatigue on movement patterns during a loaded ruck march

Audra Bloch[1], John Steckenrider[1], Rebecca Zifchock[1], Gregory Freisinger[1], Victoria Bode[2], Seth Elkin-Frankston[2]

[1]United States Military Academy, [2]Combat Capabilities Development Command Soldier Center

2:22pm - 2:34pm

O1.4.5 - Walking changes after loaded ruck march, independent of factors related to a 72-hour simulated field mission

Amy Silder[1], Trevor Viboch[1], Hedaya Rizeq[1], Victoria Bode[2], Seth Elkin-Frankston[2], Pinata Sessoms[1]

[1]Naval Health Research Center, [2]Combat Capabilities Development Command Soldier Center

2:35pm - 2:47pm

O1.4.6 - Gait Symmetry and Stability in Service Members with Unilateral Transfemoral Amputation Twelve Months After Osseointegration

Julian Acasio[1], Brad Hendershot[1], Christopher Dearth[1], Benjamin Potter[1], Jonathan Forsberg[1]

[1]Walter Reed National Military Medical Center

2:48pm - 3:00pm

O1.4.7 - Assessing the soldier survivability tradespace using a single IMU

Matthew Mavor[1], Matthew Mavor[1], Kristina Gruevski[2], Linda Bossi[2], Thomas Karakolis[2], Ryan Graham[1]

[1]University of Ottawa, [2]Defence Research and Development Canada

Room 214

O1.5 – SPORTS INJURIES 1

Session Moderator: **Daniel Benoit**, *University of Ottawa*

1:30pm - 1:42pm

O1.5.1 - Loading asymmetry before and after runners sustain a lower extremity bone stress injury

Harper Stewart[1], Ryan Alcantara[2], Kathryn Farina[3], Alena Grabowski[4], Michael Hahn[5], Rodger Kram[4], Jill McNitt-Gray[1]

[1]University of Southern California, [2]Stanford University, [3]Adidas, [4]University of Colorado, [5]University of Oregon

1:43pm - 1:55pm

O1.5.2 - Kinematic predictors of failed drop-vertical jump landings in adolescent athletes

Nicholas Romanchuk[1], Lisa Ek Orloff[1], Celine Girard[1], Michael Del Bel[1], Daniel Benoit[1]

[1]University of Ottawa

1:56pm - 2:08pm

O1.5.3 - Peak knee extension torque is related to total bone mineral density among female collegiate field sport athletes

Katie Collins[1], Ashley Triplett[1], Matthew Harkey[1], D.S. Blaise Williams III[2], Brad Winn[2], Christopher Kuenze[1]

[1]Michigan State University, [2]Nike Sport Research Laboratory

2:09pm - 2:21pm

O1.5.4 - Agreement between GFT & Hybrid-III head kinematics for different impact scenarios in ice hockey

Olivia Aguiar[1], Jeremiah Zacharias[1], Omid Vakili[1], Stephen Robinovitch[1]

[1]Simon Fraser University

2:22pm - 2:34pm

O1.5.5 - Ergometer rowing places the hip at risk of injury: a biomechanical, clinical, and coaching assessment with implications for injury prevention and exercise prescription

Jordan Ankersen[1], Bradley Lambert[2], Stephanie Gardner[2], Michael Moreno[1], Joshua Harris[2], Shari Liberman[2]

[1]Texas A&M University, [2]Houston Methodist

2:35pm - 2:47pm

O1.5.6 - A PCA and Hierarchical Clustering Analysis of the Relationship Between Pelvis Geometry and Bone Stress Injury Incidence in Collegiate Cross Country Runners

Jack Martin[1], Bryan Heiderscheit[1]

[1]University of Wisconsin

2:48pm - 3:00pm

O1.5.7 - The effect of lateral tibial posterior slope angle on internal tibial rotation and anterior tibial translation during simulated jump landings

So Young Baek[1], Melanie Beaulieu[1], Edward Wojtys[1], James Ashton-Miller[1]

[1]University of Michigan

3:00pm – 3:30pm
Foyer

BREAK

3:30pm – 5:00pm
Room 215

SESSION 2

S2 - Biomechanics in Interdisciplinary Collaborative Research Efforts - Experience in the BACk PAin Consortium (BACPAC)

Dennis Anderson[1], Adam Quirk[2], Marit Johnson[3], Anton Bowden[4], William Marras[5]

[1]Beth Israel Deaconess Medical Center / Harvard Medical School, [2]Harvard University, [3]University of Pittsburgh, [4]Brigham Young University, [5]The Ohio State University

Room 203

S3 - The Biomechanics of Trail Running: Past, Present and Future

Laura Healey[1], Karen Mickle[2], Daniel Feeney[3], Wouter Hoogkamer[4]

[1]Puma, [2]La Trobe University, [3]BOA Technology, [4]University of Massachusetts, Amherst

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Room 207/208

O2.1 – ERGONOMICS & OCCUPATIONAL BIOMECHANICS 1

Session Moderator: **Julie Cote**, *McGill University &* **Wayne Albert**, *University of New Brunswick*

3:30pm - 3:42pm

O2.1.1 - The effect of chair recline on neck muscle function during seated computer work

Whitney Wolff[1], Constantin Heinemann[1], James Ashton-Miller[1], David Lipps[1]

[1]University of Michigan

3:43pm - 3:55pm

O2.1.2 - The effect of training & workstation quality on discomfort during the COVID-19 pandemic

Megan McAllister[1], Patrick Costigan[1], Joshua Davies[1], Tara Diesbourg[2]

[1]Queen's University, [2]Oakland University

3:56pm - 4:08pm

O2.1.3 - Neuromuscular activity and percieved discomfort comparison between active chairs, a traditional chair and standing

Michelle Léger[1], Cynthia Dion[2], Michelle Cardoso[2], Wayne Albert[1]

[1]University of New Brunswick, [2]Université de Moncton

4:09pm - 4:21pm

O2.1.4 - Task dependence of centre of pressure variability

Puneet Singh[1], Michelle Léger[2], Cynthia Dion[1], Wayne Albert[2], Michelle Cardoso[1]

[1]Université de Moncton, [2]University of New Brunswick

4:22pm - 4:34pm

O2.1.5 - Lumbar spine fidgets, low back pain, and productivity in prolonged sitting and standing

Liana Tennant[1], Jackie Zehr[1], Jessa Buchman-Pearle[1], Jack Callaghan[1]

[1]University of Waterloo

4:35pm - 4:47pm

O2.1.6 - Exploring the biomechanical basis for a strength asymmetry between dominant and non-dominant arms

Fahima Wakeely[1], Michael Watterworth[1], Ryan Foley[1], Nicholas La Delfa[1]
[1]*Ontario Tech University*

4:48pm - 5:00pm

O2.1.7 - Quantifying the effects of patient BMI and scan location on upper extremity posture and joint strength capability in sonographers using digital human modeling

Cameron Lang[1], Alan Cudlip[1], Michael Holmes[1]
[1]*Brock University*

Room 214

O2.2 – INSIGHTS ON SLIPS, TRIPS, FALLS

Session Moderator: **Andrew Laing**, *University of Waterloo &*
Jeremy Crenshaw, *University of Delaware*

3:30pm - 3:42pm

O2.2.1 - Slip-and-fall risk posed by sloped walking surfaces

Corbin Rasmussen[1], Abderrahman Ouattas[1], Nathaniel Hunt[1]
[1]*University of Nebraska*

3:43pm - 3:55pm

O2.2.2 - Pain perception during lateral falls: influence of fall simulation protocols, body composition & impact dynamics

Sukirat Bhullar[1], Steven Pretty[1], Andrew Laing[1]
[1]*University of Waterloo*

3:56pm - 4:08pm

O2.2.3 - Kinematic factors that best discriminate falls from recoveries following unconstrained slips

Abderrahman Ouattas[1], Corbin Rasmussen[1], Nate Hunt[1]
[1]*University of Nebraska*

4:09pm - 4:21pm

O2.2.4 - Susceptibility to walking balance perturbations may generalize across contexts

Andrew Shelton[1], Ellora McTaggart[1], Jessica Allen[2], Vicki Mercer[1], Jeremy Crenshaw[3], Jason Franz[1]
[1]*University of North Carolina,* [2]*West Virginia University,* [3]*University of Delaware*

4:22pm - 4:34pm

O2.2.5 - Distal-to-proximal redistribution of propulsion does not correlate with margin of stability during fast or typical walking

Francesca Wade[1], Bryce Daniels[1], David Clark[2], Rachael Seidler[1], Todd Manini[1], Daniel Ferris[1], Chris Hass[1]
[1]*University of Florida,* [2]*Malcom Randall VA Medical Center/University of Florida*

4:35pm - 4:47pm

O2.2.6 - Unpredictable discrete mediolateral treadmill perturbations increased self-paced walking speed

cesar castano[1], helen huang[1]
[1]*University of Central Florida*

4:48pm - 5:00pm

O2.2.7 - Correlation between trochanteric soft tissue stiffness and hip fracture risk during sideways falls

Kitaek Lim[1], Seungsu Kim[1], Woochol Choi[1]
[1]*Yonsei University*

Room 205/206

O2.3 – KNEE OSTEOARTHRITIS

Session Moderator: **Katherine Boyer**, *University of Massachusetts &* **Monica Maly**, *University of Waterloo*

3:30pm - 3:42pm

O2.3.1 - Quantifying biomechanical performance of a tri-compartment offloader brace in adults with knee osteoarthritis

Chris McGibbon[1], Emily Bishop[2], Janet Ronsky[2]
[1]*University of New Brunswick,* [2]*University of Calgary*

3:43pm - 3:55pm

O2.3.2 - At-home assessment of walking and chair stand movements using wearable sensors in knee osteoarthritis: a reliability study

Michael Rose[1], Tuhina Neogi[2], Brian Friscia[1], Kaveh Torabian[1], Michael LaValley[1], Mary Gheller[2], Lukas Adamowicz[3], Pirinka Georgiev[3], Lars Viktrup[4], Charmaine Demanuele[3], Paul Wacnik[3], Deepak Kumar[1]
[1]*Boston University,* [2]*Boston University School of Medicine,* [3]*Pfizer Inc.,* [4]*Eli Lilly and Company*

3:56pm - 4:08pm

O2.3.3 - Subject-specific modelling of muscle force during gait in total knee arthroplasty

Erik Kowalski[1], Alexandre Pelegrinelli[1], Nicholas Ryan[1], Mario Lamontagne[1]
[1]*University of Ottawa*

4:09pm - 4:21pm

O2.3.4 - Improving muscle capacity utilization with a 12-week strengthening program for women with symptomatic knee osteoarthritis

Jacquelyn Maciukiewicz[1], Emma Tung[1], Elora Brenneman Wilson[2], Monica Maly[1]
[1]*University of Waterloo,* [2]*McMaster University*

4:22pm - 4:34pm

O2.3.5 - The role of cumulative loading on predicting changes in knee cartilage outcomes: Data from the Osteoarthritis Initiative

Natasha Ivanochko[1], Anthony Gatti[2], Paul Stratford[3], Monica Maly[1]
[1]*University of Waterloo,* [2]*Stanford University,* [3]*McMaster University*

4:35pm - 4:47pm

O2.3.6 - Impact of an Exercise Bout on Muscle Activation Patterns in Individuals with Knee Osteoarthritis

Skylar Holmes[1], Katherine Boyer[1]
[1]*University of Massachusetts*

4:48pm - 5:00pm

O2.3.7 - Kinematic and kinetic asymmetries in individuals with unilateral, mild-to-moderate knee osteoarthritis during gait

Carson Halliwell[1], Derek Rutherford[1], Rebecca Moyer[1]
[1]*Dalhousie University*

Room 201

THEMATIC POSTER SESSION 1 - ASSISTIVE TECHNOLOGIES

Session Moderator: **Amy Wu**, *Queen's University &*
Peter Adamczyk, *University of Wisconsin*

TP1.1 Effects of actuation timing and magnitude of a semi-rigid hip exoskeleton on metabolic cost

Arash Mohammadzadeh Gonabadi[1], Prokopios Antonellis[2], Sara Myers[1], Iraklis Pipinos[1], Philippe Malcolm[1]

[1]University of Nebraska, [2]Oregon Health & Science University

TP1.2 Continuous Testing of Sonomyography as a Control Paradigm for Upper Limb Prostheses

Erica King[1], Susannah Engdahl[1], Samuel Acuña[1], Ahmed Bashatah[1], Siddhartha Sikdar[1]

[1]George Mason University

TP1.3 The Effect of Ankle Foot Orthoses on Ground Reaction Forces in Patients with Peripheral Artery Disease

Zahra Salamifar[1], Farahnaz Fallah tafti[1], Iraklis Pipinos[1], Jason Johanning[1], Hafizur Rahman[1], Mahdi Hassan[1], Sara Myers[1]

[1]University of Nebraska

TP1.4 Evaluation of high density surface electromyography for prosthesis control

Corey Pew[1], Fred Christensen[1]

[1]Montana State University

TP1.5 Effects of gait velocity on mechanical cost-of-transport when wearing a customized passive-dynamic ankle-foot orthosis

Corey Koller[1], Luke Nigro[1], Jacob Skigen[1], Jason Wilken[2], Darcy Reisman[1], Elisa Arch[1]

[1]University of Delaware, [2]University of Iowa

TP1.6 Optimization of a shoulder-assistive exosuit via musculoskeletal modeling

Kaleb Burch[1]

[1]University of Delaware

5:00pm – 7:00pm
Foyer, Rooms 202, 209, and 210

POSTER SESSION 1

Review the posters, discuss with poster presenters and enjoy some light snacks.

7:00pm – 9:30pm
Canadian Museum of History, Grand Hall

OPENING RECEPTION

Sponsored by OptiTrack

Meet at the front entrance to the Shaw Centre to walk over to the Museum, a short 15 minute walk, or board one of a few buses for the short transfer. A stand up grazing reception in a spectacular Canadian museum is the location for this event.

DAY 3 Tuesday August 23, 2022

8:00am – 9:00am
Gatineau Salon

KEYNOTE LECTURE 2

Bridging the Gap: Being a "Pracacademic" in the World of Elite Sport

Adam Douglas, *Club de Hockey Canadien*

9:15am – 10:15am
Gatineau Salon

ASB BORELLI AWARD

Thomas S. Buchanan, *University of Delaware*

10:15am – 10:45am
Foyer

BREAK

10:45am – 12:15pm
Room 215

CSB MSC AND PHD AWARD SESSION

Sponsored by Theia Markerless

MASTERS STUDENT AWARD FINALISTS

The non-intuitive, in-vivo behaviour of aponeuroses in a uni-pennate muscle

Sarah Abrahamovic, *University of Calgary*

Adaptations in serial sarcomere number and whole-muscle passive properties to weighted downhill running in rats

Avery Hinks, *University of Guelph*

In vivo TAK-242 treatment and its effect on mechanical properties and gene expression associated with IVD degeneration in SPARC-null mice

Mitch Whittal, *Wilfrid Laurier University*

DOCTORAL STUDENT AWARD FINALISTS

Sex-related variations in tibial-fibular geometry are associated with higher bone strain in young active females

Olivia Bruce, University of Calgary

Decoupled deformations of cell and cartilage tissue during cyclic loading

Baaba Otoo, *University of Calgary*

Comparison of machine learning classifiers for differentiating level and sport using movement data

Gwyneth Ross, *University of Ottawa*

Room 205/206

ASB JOURNAL OF BIOMECHANICS AND CLINICAL BIOMECHANICS AWARD SESSION

Session Moderators: **David Lipps**, *University of Michigan &*
Missy Morrow, *The University of Texas*

Characterization of elbow flexion recovery following surgery for traumatic brachial plexus injury

Eric J Noonan, Sandesh G Bhat, Griffin Mess, Emily Miller, Paul Kane, Alexander Y Shin, Kenton R Kaufman

Patellofemoral knee mechanics 3 months after ACL reconstruction are associated with markers of patellofemoral cartilage degradation 24 months after surgery

Jack R Williams, Kelsey Neal, Abdulmajeed Alfayyadh, Jacob J Capin, Ashutosh Khanda, Kurt Manal, Lynn Snyder-Mackler, Thomas S Buchanan

Shear wave tensiometry predictions of Achilles tendon force during running

Alex J Reiter, Jack A Martin, Keith A Knurr, Darryl G Thelen

Direct intraoperative length-tension measurements of human gracilis muscle

Benjamin I Binder-Markey, Lomas S Persad, Alexander Y Shin, William Litchy, Kenton R Kaufman, Richard L Lieber

12:15pm – 1:30pm
Foyer

LUNCH

Grab a lunch box, visit an exhibitor, explore the outside!

Room 214

ASB STUDENT CHAPTER MEETING

The ASB Student Body will be hosting the second annual Student Chapters Meeting during lunch. The purpose of this event is for members of ASB Student Chapters to come together to exchange ideas and ask questions about what their chapters have been doing over the past year, as well as provide a space for students interested in starting an ASB chapter to ask any questions they have about the process. The ASB Student Rep, as well as several current chapter presidents, will be on hand to lead a Q&A session, which will be followed by time to break into smaller groups and meet people from other schools.

Room 215

CSB ANNUAL GENERAL MEETING

All members of CSB are welcome to attend and learn more about the society, its future and current news.

1:30pm – 3:00pm
Room 214

SESSION 3

S4 - Using Virtual Reality for Physical Rehabilitation

Samuel Acuña[1], David Labbé[2], Arik Yates[3], Eric Jenkins[4]

[1]George Mason University, [2]École de technologie supérieure, [3]Neuro Rehab VR, [4]DIH Technology Co

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Room 203

ASB SYMPOSIUM: RUNNING

Session Moderator: **Allison Altman-Singles**, *The Pennsylvania State University*

1:30pm - 1:42pm

S5.1 - Comparison of type of running sessions for female high school cross-country runners

Micah Garcia[1], David Bazett-Jones[1]

[1]University of Toledo

1:43pm - 1:55pm

S5.2 - Foot arch function in running: changes due to the windlass mechanism and foot strike pattern

Daniel Davis[1], John Challis[1]

[1]Pennsylvania State University

1:56pm - 2:08pm

S5.3 - Changing ground contact time to reduce Achilles tendon force during running outdoors

Kevin Aubol[1], Clare Milner[1]

[1]Drexel University

2:09pm - 2:21pm

S5.4 - Effects of mild declines on the metabolic cost of running

Montgomery Bertschy[1], Michael Hester[1], Stephen Diefenderfer[1], Kristine Snyder[2], Wouter Hoogkamer[1]

[1]University of Massachusetts, [2]Stryd, Inc.

2:22pm - 2:34pm

S5.5 - Mechanical and morphological properties of the plantar fascia in response to imposed running demands over three consecutive days

Lukas Krumpl[1], Joshua Bailey[1]

[1]University of Idaho

2:35pm - 2:47pm

S5.6 - Lower Limb Kinetics During Curve Sprinting in Athletes With a Leg Amputation

Gabriela Diaz[1], Ryan Alcantara[2], Alena Grabowski[1]

[1]University of Colorado, [2]Stanford University

2:48pm - 3:00pm

S5.7 - Data mining approach to determining gait abnormalities in runners with patellofemoral pain syndrome

Ross Brancati[1], Katherine Boyer[1]

[1]University of Massachusetts

Room 207/208

O3.1 – ERGONOMICS & OCCUPATIONAL BIOMECHANICS 2

Session Moderator: **Jim Potvin**, *McMaster University &*
Michelle Cardoso, *University of Moncton*

1:30pm - 1:42pm

O3.1.1 - Influence of sex and strength capacity on normalized low-back moments during backboard lifting

Justin Davidson[1], David Clusiault[1], Daniel Armstrong[1], Steven Fischer[1]
[1]University of Waterloo

1:43pm - 1:55pm

O3.1.2 - Sex-Specific Kinematic Adaptations to Fatigue in Asymmetrical Lifting

Daniel Armstrong[1], Michelle Cardoso[2], Steven Fischer[1], Wayne Albert[3]
[1]University of Waterloo, [2]Université de Moncton, [3]University of New Brunswick

1:56pm - 2:08pm

O3.1.3 - Back loading prediction with inertial motion capture during manual material handling

Antoine Muller[1], Hakim Mecheri[2], Philippe Corbeil[3], Andre Plamondon[2], Xavier Robert-Lachaine[2]
[1]Université Claude-Bernard Lyon 1, [2]IRSST, [3]Université Laval

2:09pm - 2:21pm

O3.1.4 - An electromyography based multi-muscle fatigue index formulatiion and validation

Leonardo Wei[1], Suman Chowdhury[1]
[1]Texas Tech University

2:22pm - 2:34pm

O3.1.5 - Low back disorder risk classification during material handling using wearable sensors: a feasibility study

Cameron Nurse[1], Laura Elstub[1], Peter Volgyesi[1], Karl Zelik[1]
[1]Vanderbilt University

2:35pm - 2:47pm

O3.1.6 - The influence of back muscle fatigue on training approaches to reduce lumbar spine motion during occupational lifting tasks

Kayla Fewster[1], Dennis Larson[2], Stephen Brown[2]
[1]University of British Columbia, [2]University of Guelph

2:48pm - 3:00pm

O3.1.7 - Identifying the best window size and lead time and best sensor combination for classification of injurious versus non-injurious patient transfer from bed to wheelchair

Kitaek Lim[1], Seyoung Lee[1], Woochol Choi[1]
[1]Yonsei University

Room 205/206

O3.2 – LOCOMOTION 1

Session Moderator: **Jessica Allen**, *University of West Virginia &*
Phillippe Dixon, *University of Montreal*

1:30pm - 1:42pm

O3.2.1 - Effect of ankle quasi-stiffness on balance control during walking at different speeds

Stephanie Molitor[1], Nicholas Fey[1], Glenn Klute[2], Richard Neptune[1]
[1]University of Texas, [2]University of Washington

1:43pm - 1:55pm

O3.2.2 - The effect of dual-tasks on cognitive performance and balance control during walking with altered step widths

Gabriella Small[1], Lindsey Lewallen[1], Richard Neptune[1]
[1]University of Texas

1:56pm - 2:08pm

O3.2.3 - Knee joint quasi stiffness during mid-stance in adults with and without obesity

Derek Pamukoff[1], Steven Garcia[2], Michael Vakula[3], Skylar Holmes[4]
[1]Western University, [2]University of Michigan, [3]Utah State University, [4]University of Massachusetts

2:09pm - 2:21pm

O3.2.4 - Influence of Context on Human Walking in the Real World

Loubna Baroudi[1], Xinghui Yan[1], Mark Newman[1], Kira Barton[1], Stephen Cain[2], K Alex Shorter[1]
[1]University of Michigan, [2]West Virginia University

2:22pm - 2:34pm

O3.2.5 - Reliability of hip and knee kinematics during level and incline treadmill walking

Aleksandra Budarick[1], Carson Halliwell[1], Derek Rutherford[1], Rebecca Moyer[1]
[1]Dalhousie University

2:35pm - 2:47pm

O3.2.6 - How does motor complexity alter gait quality? Data-driven analysis of simulated motor impairments.

Michael Rosenberg[1], Taniel Winner[1], Gordon Berman[1], Trisha Kesar[1], Lena Ting[1]
[1]Emory University

2:48pm - 3:00pm

O3.2.7 - Gait Stability During Treadmill Walking: Are There Sex Differences in Young Adults?

Alexandre Mir-Orefice[1], Christopher Bailey[1], Julie Nantel[1], Ryan Graham[1]
[1]University of Ottawa

Room 215

O3.3 – NEUROSCIENCE AND MOTOR CONTROL

Session Moderator: **Chris Hass**, *University of Florida &*
Caitlin Banks, *Kennedy Krieger Institute & Sidney Baudendistel, Washington University*

1:30pm - 1:42pm

O3.3.1 - Effect of fiber tracts and depolarized brain volume on resting motor thresholds during transcranial magnetic stimulation

Neil Mittal[1], Yeajin Cho[1], Connor Lewis[1], Ravi Hadimani[1], Carrie Peterson[1]
[1]Virginia Commonwealth University

1:43pm - 1:55pm

O3.3.2 - Effects of increasing skin temperature on foot sensitivity and postural control in during aging

Mathias Machado[1], Álvaro Machado[1], Eliane Guadagnin[1], Daniel Schmidt[2], Andresa Germano[2], Felipe Carpes[1]
[1]Federal University of Pampa, [2]Chemnitz University of Technology

1:56pm - 2:08pm

O3.3.3 - Do humans regulate mediolateral stability from step-to-step?

Meghan Kazanski[1], Joseph Cusumano[1], Jonathan Dingwell[1]
[1]Pennsylvania State University

2:09pm - 2:21pm

O3.3.4 - Neuromechanical locomotor after-effects as a function of gravity level

Chase Rock[1], Angela Luo[1], Xiao Yang[1], Young-Hui Chang[1]
[1]Georgia Institute of Technology

2:22pm - 2:34pm

O3.3.5 - Adaptations of ground reaction forces in abrupt vs gradual split belt treadmill walking

Olivia Elie[1], Montgomery Bertschy[2], Maia Schlechter[2], Daniel Gregory[2], Wouter Hoogkamer[2], Brian Selgrade[1]
[1]Westfield State University, [2]University of Massachusetts

2:35pm - 2:47pm

O3.3.6 - A link to neural oscillations through wavelet transforms: effect of dual task standing on center of pressure trajectories in multiple sclerosis

Brittany Sommers[1], Brian Davis[1], Doug Wajda[1]
[1]Cleveland State University

2:48pm - 3:00pm

O3.3.7 - Hair considerations for equitable subject representation in neuromechanics

Lietsel Richardson[1], Nina Woodley[2], Jennifer Sandoval[1], Lindsay Neuberger[1], Helen Huang[1]
[1]University of Central Florida, [2]Pure Avidity Salon

Room 201

O3.4 – TISSUE MECHANICS 1

Session Moderator: **Heidi Ploeg**, *Queen's University &*
Brent Edwards, *University of Calgary*

1:30pm - 1:42pm

O3.4.1 - Intrinsic modulus of collagen fibres in cartilage did not change at different stages of osteoarthritis

Eng Kuan Moo[1], Mohammad Ebrahimi[1], Petri Tanska[1], Rami Korhonen[1]
[1]*University of Eastern Finland*

1:43pm - 1:55pm

O3.4.2 - Collagen-based contributions to femoral strength in fall-related hip fractures

Daniel Martel[1], Daniel Dapaah[1], Taylor Winberg[1], Thomas Willett[1], Andrew Laing[1]
[1]*University of Waterloo*

1:56pm - 2:08pm

O3.4.3 - Mechanical uncoiling of collagen as a toughening mechanism of cortical bone

Corin Seelemann[1], Thomas Willett[1]
[1]*University of Waterloo*

2:09pm - 2:21pm

O3.4.4 - Can cartilage sustain fluid load support as contact forces increase during movement?

Steven Voinier[1], David Burris[1]
[1]*University of Delaware*

2:22pm - 2:34pm

O3.4.5 - Site-specific Mechanical Properties of Porcine Knee Cartilage Determined with Indentation Maps and Machine Learning

Erfan Hamsayeh Abbasi Niasar[1], LePing Li[1]
[1]*University of Calgary*

2:35pm - 2:47pm

O3.4.6 - The Probability of Whole-Bone Fatigue Fracture Can Be Accurately Predicted Using Specimen-Specific Finite Element Analysis Incorporating a Stochastic Failure Model

Ifaz Haider[1], Andrew Pohl[1], W Brent Edwards[1]
[1]*University of Calgary*

2:48pm - 3:00pm

O3.4.7 - The effect bone geometry on contact stress in 3d-finite elemtn hindfoot model

Jinhyuk Kim[1]
[1]*Old Dominion University*

3:00pm – 3:30pm
Foyer

BREAK

3:30pm – 5:00pm
Room 203

SESSION 4

CSB Symposium: S6 - Insights through biomechanics on the cause and prevention of head impacts and injuries from falls in older adults

Michael Cusimano[1], Stephen Robinovitch[2], Vicki Komisar[3], Thomas (Blaine) Hoshizaki[4], Andrew Laing[5]

[1]University of Toronto, [2]Simon Fraser University, [3]The University of British Columbia - Okanagan, [4]University of Ottawa, [5]University of Waterloo

Room 214

S7 - Factors Other Than Metabolic Minimization That Shape Movement Strategies

Daniel Ferris[5],Alaa Ahmed[1], Monica Daley[2], Helen Huang[3], Jessica Selinger[4]

[1]University of Colorado, Boulder, [2]University of California, Irvine, [3]University of Central Florida, [4]Queen's University, [5]University of Florida

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Room 215

O4.1 – IMAGING 2 – SOFT TISSUE

Session Moderator: **Trey Crisco**, *Brown University &* **Don Anderson**, *University of Iowa*

3:30pm - 3:42pm

O4.1.1 - High-Field MRI Analysis of the 3D Geometry of the Triple-Bundle Achilles Tendon

Stephanie Cone[1], Hoon Kim[2], Jason Franz[2], Darryl Thelen[1]

[1]University of Wisconsin, [2]University of North Carolina

3:43pm - 3:55pm

O4.1.2 - Multi-sweep 3-dimensional ultrasound provides accurate in vivo muscle volume quantification, expanding use to larger muscles

Jorie Budzikowski[1], Wendy Murray[1]

[1]Northwestern University

3:56pm - 4:08pm

O4.1.3 - Muscle density analysis using computed tomography: an internal calibration approach

Ainsley Smith[1], Justin Tse[1], Tadiwa Waungana[1], Michael Kuczynski[1], Steven Boyd[1], Sarah Manske[1]

[1]University of Calgary

4:09pm - 4:21pm

O4.1.4 - Can we reliably measure strain in the iliotibial band via ultrasound during isolated contractions?

Laura Hutchinson[1], Glen Lichtwark[1], Luke Kelly[1]

[1]University of Queensland

4:22pm - 4:34pm

O4.1.5 - Reliability of t1rho and t2 measurements of cartilage in healthy knees under load*

John Ramsdell[1], Bruce Beynnon[1], Mack Garner-Morse[1], Jiming Zhang[1], Matthew Geeslin[1], Timothy Tourville[1], Mathew Failla[1], Andrew Borah[1], Mickey Krug[1], Niccolo Fiorentino[1]

[1]University of Vermont

4:35pm - 4:47pm

O4.1.6 - Test-Retest Reliability of T1ρ and T2 in Small and Large Tube Phantoms and Left-Right of Isocenter Positional Dependence*

Niccolo Fiorentino[1], Mack Gardner-Morse[1], Andrew Borah[1], John Ramsdell[1], Jiming Zhang[1], Pamela Vacek[1], Mickey Krug[1], Matthew Geeslin[1], Timothy Tourville[1], Mathew Failla[1], Bruce Beynnon[1]

[1]University of Vermont

4:48pm - 5:00pm

O4.1.7 - How do muscle form and function relate in spinal muscular atrophy and Duchenne muscular dystrophy?

Allison McCrady[1], Robert Gutierrez[1], Chelsea Masterson[1], Medhi Boukhechba[1], Laura Barnes[1], Rebecca Scharf[1], Silvia Blemker[1]

[1]University of Virginia

Room 205/206

O4.2 – LOCOMOTION 2 – PROSTHESES & ORTHOSES

Session Moderator: **Chris McGibbon,** *University of New Brunswick &* **Michelle Oliver**, *University of Guelph*

3:30pm - 3:42pm

O4.2.1 - Evaluation of a novel robotic ankle prosthesis: stiffness emulation and active push-off

Anthony Anderson[1], Yuri Hudak[1], Kira Gauthier[1], Brittney Muir[1], Patrick Aubin[2]

[1]University of Washington & Center for Limb Loss and Mobility, [2]University of Washington

3:43pm - 3:55pm

O4.2.2 - Effect of prosthetic ankle push-off power and foot stiffness on individual leg work during walking in people with transtibial amputation

Joshua Tacca[1], Zane Colvin[1], Alena Grabowski[1]

[1]University of Colorado

3:56pm - 4:08pm

O4.2.3 - Hip biomechanics in people with unilateral above-knee and through-knee amputations

Brieuc Panhelleux[1], Alison McGregor[1], Anne Silverman[2]

[1]Imperial College London, [2]Colorado School of Mines

4:09pm - 4:21pm

O4.2.4 - Muscle-driven, implanted foot-ankle prosthesis: preliminary in vivo biomechanics

Katrina Easton[1], Caleb Stubbs[1], Caroline Billings[1], Kristin Bowers[1], Stacy Stephenson[1], Cheryl Greenacre[1], David Anderson[1], Dustin Crouch[1]

[1]University of Tennessee

4:22pm - 4:34pm

O4.2.5 - Ankle mechanics of typical individuals walking with a bi-linear stiffness ankle-foot orthosis

Luke Nigro[1], Elisa Arch[1]

[1]University of Delaware

4:35pm - 4:47pm

O4.2.6 - A biomechanical assessment of a service member with transtibial amputation across the utilization of different prosthetic feet

Tyler Cardinale[1], Shannon Isley[1], Tanya Djafar[1], Trevor Kingsbury[1]
[1]*Navy Medicine Readiness and Training Command San Diego*

4:48pm - 5:00pm

O4.2.7 - Idealized assistive knee brace predictive modeling framework

Alexa Boyer[1], Scott Brandon[1]
[1]*University of Guelph*

Room 207/208

O4.3 – TRUNK & SPINE 1

Session Moderator: **Rumit Singh**, *Oakland University &* **Seth Higgins**, *Oakland University*

3:30pm - 3:42pm

O4.3.1 - Loading History Alters Compression Tolerance and Mechanical Properties in Spine Tissues

Jackie Zehr[1], Jeff Barrett[1], Fasih Rahman[1], Joe Quadrilatero[1], Jack Callaghan[1]
[1]*University of Waterloo*

3:43pm - 3:55pm

O4.3.2 - Sedentary profile is a potential predictor of transient low back pain

Graham Mayberry[1], Jack Callaghan[1], Janessa Drake[2]
[1]*University of Waterloo,* [2]*York University*

3:56pm - 4:08pm

O4.3.3 - The impact of combined flexion and compression on the mechanical integrity of the annulus fibrosus

Keaton Briar[1], Diane Gregory[1]
[1]*Wilfrid Laurier University*

4:09pm - 4:21pm

O4.3.4 - Effect of prolonged sitting on trunk muscle responses to suddenly applied loads

Sam Vasilounis[1], Janessa Drake[1]
[1]*York University*

4:22pm - 4:34pm

O4.3.5 - The effects of a dynamic core stability group exercise intervention on trunk muscle activity, strength, and endurance in people with and without a history of low back pain: a randomized controlled trial

Gillian Hatfield[1]
[1]*University of the Fraser Valley*

4:35pm - 4:47pm

O4.3.6 - Using muscle fatigue and movement training to explore the relationship between dynamic stability and coordination variability of the lumbar spine

Dennis Larson[1], Stephen Brown[1]
[1]*University of Guelph*

4:48pm - 5:00pm

O4.3.7 - A morphable lumbar spine model controlled by anatomical measurements

Allison Clouthier[1], Jessica Wenghofer[1], Eugene Wai[2], Ryan Graham[1]
[1]*University of Ottawa*, [2]*The Ottawa Hospital*

Room 201

THEMATIC POSTER SESSION 2 - KNEE JOINT LOADING/OSTEOARTHRITIS

Session Moderator: **Paul De Vita**, *East Carolina University &*
Steve Messier, *Wake Forest University*

TP2.1 The influence of knee position on ultrasound imaging of femoral cartilage in individuals with anterior cruciate ligament reconstruction

Harry Battersby[1], Skylar Holmes[2], Eric Shumski[3], Caitlyn Heredia[4], Steven Garcia[5], Derek Pamukoff[1]
[1]*Western University*, [2]*University of Massachusetts, Amherst*, [3]*University of Georgia*, [4]*Northern Arizona University*, [5]*University of Michigan*

TP2.2 Dominant vs. NonDominant Knee Joint Contact Forces During Load Carriage

Blake Jones[1], John Willson[1], Paul DeVita[1], Ryan Wedge[1]
[1]*East Carolina University*

TP2.3 Predictions of knee joint contact forces using only kinematic inputs with a recurrent neural network

Kaileigh Estler[1], Hunter Bennett[2]
[1]*University of Tennessee-Knoxville*, [2]*Old Dominion University*

TP2.4 Comparison of in-lab and out-of-lab gait among healthy young and older adults and older adults with knee osteoarthritis

Mayumi Wagatsuma[1], Julien Mihy[1], Stephen Cain[2], Jocelyn Hafer[1]
[1]*University of Delaware*, [2]*West Virginia University*

TP2.5 Differences in biomechanics and muscle activation features during walking and muscle strength between males and females across clinical knee osteoarthritis severity

Cheryl Hubley-Kozey[1], Bernadette McCann[1], Dianne Ikeda[1], Janie Astephen Wilson[1], William Stanish[1]
[1]*Dalhousie University*

TP2.6 Validating in-vivo bone remodelling measurements in knee osteoarthritis

Daphne Kaketsis[1], Jason Werle[1], Nicholas Desy[1], Richard Ng[1], Emma Billington[1], Peter Salat[1], Sarah Manske[1]
[1]*University of Calgary*

5:30pm – 7:00pm
Rooms 214

EARLY CAREER FACULTY PROFESSIONAL DEVELOPMENT SYMPOSIUM

Sponsored by **C-STAR**

This symposium will provide an opportunity to receive advice from the senior ASB and CSB members on topics relevant to setting up an independent research and/or teaching program. The theme of this year's session is "Strategic Planning for Lifelong Professional Success." We hope to see you there! There will also be a social gathering after for those who would like to join!

5:30pm – 7:00pm
Parliament Foyer (3rd Floor)

TRAINEE PROFESSIONAL DEVELOPMENT

This roundtable style event welcomes undergraduate students, graduate students and postdoctoral fellows to speak with and learn from experienced members of the biomechanics community about a variety of topics. Some academic topics will include the preparation of scholarship/fellowship applications for national funding agencies (e.g., NIH, NSF, NSERC, CIHR), manuscript writing and reviewing as well as the differences between pursuing academia in the US and Canada. Non-academic topics will include, but are not limited to: government and industry career paths, technology development and entrepreneurship as well as equity, diversity and inclusion in academia.

7:00pm – 8:00pm
Room 201

TEACHING BIOMECHANICS INTEREST GROUP

The Teaching Biomechanics Interest Group (T-BIG) was started in 2020 among a group of teaching-focused biomechanists. Since that time, they have shared advice and resources, collaborated on projects, and run conference programming to support and further the challenges of teaching in this nuanced field. Examples of these initiatives have centered around promoting undergraduates and undergraduate research, and supporting biomechanists from primarily undergraduate institutions. Biomechanists at all levels and types of institutions are welcome to join. The affinity group event will be a hybrid-style event, as many from our group will be busy with teaching during NACOB this year. This networking event will include a brief presentation on the accomplishments of the group thus far, short and long term goals, and an open discussion regarding the mission and goals of the group.

Please join the T-BIG Slack to get involved and receive regular T-BIG updates.

7:30pm – 10:00pm
Heart and Crown in Byward Market

TRAINEE SOCIAL

Join us for a lively night out at the Heart & Crown in Byward. Located steps from the convention centre, registration is only $10 and includes minimal food and drink. The NACOB student committee will host a game of trivia beginning at 8pm. Due to space constraints at the venue, capacity for the Trainee Social is limited to the first 300 registrants.

7:30pm – 11:30pm
Aulde Dubliner & Pour House

THE BLACK BIOMECHANISTS ASSOCIATION SOCIAL

The Black Biomechanists Association (BBA) is so excited to introduce our non-profit organization and look forward to connecting with you! Our mission is to uplift and enrich Black biomechanists in their academic and professional careers. We hope to continue collaborating with scientific societies, educational organizations, academic institutions, and industry corporations to provide some much-needed support for our Black students and professionals across the vast disciplines of biomechanics. Please join us for a social event to meet our members and learn more!

DAY 4 Wednesday August 24, 2022

8:00am – 9:00am
Gatineau Salon

KEYNOTE LECTURE 3

Optimality principles in human movement and in human interactions wearable robots

Sponsored by C-STAR

Katja Mombaur, *University of Waterloo*

9:15am – 10:15am
Gatineau Salon

ASB HAY AWARD

Matt Nurse, *Nike*

10:15am – 10:45am
Foyer

BREAK

10:45am – 12:15pm
Gatineau Salon

SESSION 5

ASB GOEL, PYTEL AND FOUNDERS AWARD SESSION

Moderators: David Lipps, *University of Michigan &*
Missy Morrow, *University of Texas Medical Branch/Mayo Clinic*

GOEL AWARD FOR TRANSLATIONAL RESEARCH IN BIOMECHANICS

Richard Lieber, *Shirley Ryan Ability Lab*

FOUNDERS' AWARD

Brian Umberger, *University of Michigan*

JEAN LANDA PYTEL AWARD FOR DIVERSITY MENTORSHIP IN BIOMECHANICS AWARD

Brian Davis, *Cleveland State University*

Room 201

S8 - Markerless motion capture: Exploring new research avenues

Melissa Boswell[1], Laurie Needham[2], Elise Laende[3], Jereme Outerleys[3], Kevin Deluzio[3]

[1]Stanford University, [2]University of Bath, [3]Queen's University

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Room 203

O5.1 – ACL

Session Moderator: Teresa Flaxman, *Ottawa Hospital Research Institute*
& Joana Hornestam

10:45am - 10:57am

O5.1.1 - Correlations between pre-landing knee kinematics and landing forces

Ling Li[1], Yu Song[1], Maddy Jenkins[1], Boyi Dai[1]
[1]University of Wyoming

10:58am - 11:10am

O5.1.2 - Energy absorption strategies in adolescent males and females with and without an ACL injury

Christine Smith[1], Nicholas Romanchuk[1], Michael Del Bel[1], Sasha Carsen[2], Daniel Benoit[1]
[1]University of Ottawa, [2]Children's Hospital of Eastern Ontario

11:11am - 11:23am

O5.1.3 - Knee joint moment contributions increase from running to walking after aclr during incline but not decline locomotion

Eric Finley[1], Hillary Holmes[1], Jaimie Roper[1]
[1]Auburn University

11:24am - 11:36am

O5.1.4 - Limb underloading transmits less dynamic tibiofemoral contact forces after ACLR

Amanda Munsch[1], Alyssa Evans-Pickett[1], Hope Davis-Wilson[2], Brian Pietrosimone[1], Joshua Roth[3], Jason Franz[1]
[1]University of North Carolina, [2]University of Colorado, [3]University of Wisconsin

11:37am - 11:49am

O5.1.5 - Decreases in bone mineral density are related to gait asymmetries following ACL reconstruction

Meredith Owen[1], Kelsey Reeves[1], Cale Jacobs[1], Darren Johnson[1], Chris Fry[1], Brain Noehren[1]
[1]University of Kentucky

11:50am - 12:02pm

O5.1.6 - Evaluating differences in the contribution of each lower limb during the drop vertical jump is crucial in female ACL injured pediatric population

Joana F. Hornestam[1], Blake Miller[1], Sasha Carsen[1], Daniel Benoit[1]
[1]University of Ottawa

12:03pm - 12:15pm

O5.1.7 - Knee cartilage stresses in medial femoral cartilage 6 months after acl reconstruction: a finite element analysis

Kelsey Neal[1], Jack Williams[1], Ashutosh Khandha[1], Lynn Snyder-Mackler[1], Thomas Buchanan[1]
[1]University of Delaware

Room 215

O5.2 – BALANCE AND FALLS

Session Moderator: **Scott Monfort**, *University of Montana &*
Stephen Perry, *Wilfrid Laurier University*

10:45am - 10:57am

O5.2.1 - Predicting Persistent Chemotherapy-Induced Neuromotor Dysfunction

Lise Worthen-Chaudhari[1], Patrick Schnell[1], Ajit Chaudhari[1], Scott Monfort[2], Maryam Lustberg[3]
[1]Ohio State University, [2]Montana State University, [3]Yale University

10:58am - 11:10am

O5.2.2 - Charecterizing dynamic pelvic deformation through in-vitro testing: Trochanteric adipose and the relationship with impact attenuation.

Thomas Hoshizaki[1], Iris Levine[2], Steven Pretty[1], Daniel Martel[1], Andrew Laing[1]
[1]University of Waterloo, [2]Toronto Rehabilitation Institute

11:11am - 11:23am

O5.2.3 - The effects of aging and robotic feedback on dynamic balance training biomechanics

Ava Segal[1], Peter Adamczyk[2], Andrew Petruska[1], Anne Silverman[1]
[1]Colorado School of Mines, [2]University of Wisconsin

11:24am - 11:36am

O5.2.4 - Frontal plane ankle stiffness increases with load independent of muscle activation

Zoe Villamar[1], Eric Perreault[1], Daniel Ludvig[1]
[1]Northwestern University

11:37am - 11:49am

O5.2.5 - Biomechanical efficacy of hip protectors vary across design, fall orientation, biological sex, and trochanteric soft tissue thickness

Steven Pretty[1], Rebecca Knarr[1], Andrew Laing[1]
[1]University of Waterloo

11:50am - 12:02pm

O5.2.6 - Generation of transverse plane linear and angular momenta during 90 degree turns

Mitchell Tillman[1], Antonia Zaferiou[1]
[1]Stevens Institute of Technology

12:03pm - 12:15pm

O5.2.7 - Balance and postural control in experienced and novice yoga practitioners

Angeliki Vazaka[1], Sean Maudsley-Barton[1], Richard Mills[1]
[1]Manchester Metropolitan University

Room 214

O5.3 – MUSCULOSKELETAL MODELLING & SIMULATION 1

Session Moderator: **Sarah Roelker**, *University of Massachusetts &*
Thomas Uchida, *University of Ottawa*

10:45am - 10:57 am

O5.3.1 - Personalizing a static optimization objective function for post-stroke gait

Mohammad Shourijeh[1], Di Ao[1], Marleny Vega[1], Benjamin Fregly[1]
[1]Rice University

10:58am - 11:10 am

O5.3.2 - Sensitivity of internal tibial forces and moments to static optimization joint moment constraints at the foot and ankle

Michael Baggaley[1]
[1]University of Calgary

11:11am - 11:23 am

O5.3.3 - Predictive modeling for funcitonal limb length assesment during prosthetic gait

Therese Parr[1], Brandon Lawhorn[2], John DesJardins[1]
[1]Clemson University, [2]Prisma Health

11:24am - 11:36 am

O5.3.4 - Simulating control and dynamics of human land and stop tasks

Rodolfo Amezcua-Cerda[1], Henryk Flashner[1], Jill McNitt-Gray[1]
[1]University of Southern California

11:37am - 11:49 am

O5.3.5 - Optimal control gait simulations of older adults predict foot placement trends not captured by reflex-based models

Varun Joshi[1], Katherine Boyer[2], Brian Umberger[3]
[1]The Ohio State University, [2]University of Massachusetts, [3]University of Michigan

11:50am - 12:02pm

O5.3.6 - Optimal Muscle Fiber Lengths for Human Walking

Alex Denton[1], Brian Umberger[1]
[1]University of Michigan

12:03pm - 12:15pm

O5.3.7 - Investigation of the pre- and post-thr load sharing in the proximal femur during walking

Mohamed Bendjaballah[1], Wissal Mesfar[1]
[1]King Saud University

12:15pm – 1:30pm
Foyer

LUNCH

Grab a lunch box, visit an exhibitor, explore the outside!

Room 215

ASB ANNUAL BUSINESS MEETING

All members of ASB are welcome to attend and learn more about the society, its future and current news.

1:30pm – 3:00pm
Room 203

SESSION 6

S9 - An Open-Source Approach to Multi-Modal Kinematic Imaging

Bardiya Akhbari[1], Joseph (Trey) Crisco[2], Beatriz Paniagua[3], Michael Rainbow[4], Jillian Beveridge[5]

[1]Massachusetts General Hospital, [2]The Warren Alpert Med. School of Brown University and Rhode Island Hospital, [3]Kitware, Inc., [4]Queen's University, [5]Cleveland Clinic

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Room 205/206

O6.1 – MUSCLE MECHANICS

Session Moderator: **Silvia Blemker**, *University of Virginia &*
Walter Herzog, *University of Calgary*

1:30pm - 1:42pm

O6.1.1 – Collagen distribution best explains variation in diaphragm muscle tissue stiffness across age and disease states

Ridhi Sahani[1], Christian Wallace[2], Kaitlyn Hixson[1], Silvia Blemker[1]

[1]University of Virginia, [2]University of California

1:43pm - 1:55pm

O6.1.2 - Three Dimensional and Microstructural Effects in Cerebral Palsy Affected Muscle

Ryan Konno[1], Nilima Nigam[1], James Wakeling[1], Stephanie Ross[2]

[1]Simon Fraser University, [2]University of British Columbia

1:56pm - 2:08pm

O6.1.3 - Validating a Musculoskeletal Model for Simulating Muscle Mechanics and Energetics During Human Hopping

Luke Jessup[1], Glen Lichtwark[1], Luke Kelly[1], Andrew Cresswell[1]

[1]University of Queensland

2:09pm - 2:21pm

O6.1.4 - The capacity of the in-series muscles to generate strain in the iliotibial band

Laura Hutchinson[1], Glen Lichtwark[1], Luke Kelly[1]

[1]University of Queensland

2:22pm - 2:34pm

O6.1.5 - Is sarcomerogenesis required for muscle fascicle length increases?

Torstein Daehlin[1], Zachary Fielding[1]

[1]University of Alberta

2:35pm - 2:47pm

O6.1.6 - Repeated glycerol injections leads to passive stiffening in skeletal muscle

Josh Briar[1], Alex Noonan[1], Stephen Brown[1]

[1]University of Guelph

2:48pm - 3:00pm

O6.1.7 - In vivo vastus lateralis fascicle length shortening during maximal isometric contractions

Bryan Yu[1], Walter Herzog[1]
[1]*University of Calgary*

Room 214

O6.2 – REHABILITATION

Session Moderator: **Carrie Peterson**, *Virginia Commonwealth University &* **Cheryl Hubley-Kozey**, *Dalhousie University*

1:30pm - 1:42pm

O6.2.1 - Effect of customized adaptive treadmill control on step length and trailing limb angle

Kayla Pariser[1], Margo Donlin[1], Kaitlyn Downer[1], Jill Higginson[1]
[1]*University of Delaware*

1:43pm - 1:55pm

O6.2.2 - Individuals post-stroke change energetics of multiple lower limb constituents during gait while wearing a passive-dynamic ankle foot orthosis

Jacob Skigen[1], Corey Koller[1], Keira Morgan[1], Luke Nigro[1], Elisa Arch[1]
[1]*University of Delaware*

1:56pm - 2:08pm

O6.2.3 - Stance-phase medial compartment tibiofemoral compressive forces during downhill walking in patients following total knee arthroplasty

Tanner Thorsen[1], Chen Wen[2], Songning Zhang[2]
[1]*University of Southern Mississippi*, [2]*University of Tennessee*

2:09pm - 2:21pm

O6.2.4 - Can a unilateral passive hip brace diminish walking asymmetry?

Kayla Kowalczyk[1], Philippe Malcolm[1]
[1]*University of Nebraska*

2:22pm - 2:34pm

O6.2.5 - Markerless motion capture and clinical assessment yield comparable measures of single-leg hop performance

Kayla Seymore[1], Naoaki Ito[1], Elanna Arhos[1], Haraldur Sigurðsson[2], Kenneth Cruz Rodríguez[3], Lynn Snyder-Mackler[1], Karin Grävare Silbernagel[1]
[1]*University of Delaware*, [2]*University of Iceland*, [3]*Recinto Universitario de Mayagüez*

2:35pm - 2:47pm

O6.2.6 - Botulinum Neurotoxin Improves Vasti Muscle Balance, Patellar Tracking, and Pain in Patients with Chronic Patellofemoral Pain Syndrome

Saikat Pal[1], Jang-Hwan Choi[2], Scott Delp[3], Michael Fredericson[3]
[1]*New Jersey Institute of Technology*, [2]*Ewha Womans University*, [3]*Stanford University*

2:48pm - 3:00pm

O6.2.7 - Tibiofemoral joint contact characteristics from MRI during weightbearing with lateral wedge insoles for knee osteoarthritis

Calvin Tse[1], Michael Ryan[2], Michael Hunt[1]
[1]*University of British Columbia*, [2]*Kintec Footlabs Inc.*

Room 215

O6.3 – TISSUE MECHANICS 2

Session Moderator: **Cheryl Quenneville**, *McMaster University &*
Mariana Kersh, *Illinois University*

1:30pm - 1:42pm

O6.3.1 - Ambulatory status in acute spinal cord injury impacts the efficacy of zoledronic acid to attenuate changes in hip bone density and strength

Laura Crack[1], Ifaz Haider[1], Joana Barroso[2], Narina Simonian[2], Thomas Schnitzer[2], W Brent Edwards[1]
[1]*University of Calgary*, [2]*Northwestern University*

1:43pm - 1:55pm

O6.3.2 - Quantifying the contribution of dietary mineral intake to cortical bone mechanical properties under compressive loading using finite element analysis

Mahsa Zojaji[1], Tyler Rowsell[1], Mandy E. Turner[1], Austin Lansing[1], Rachel Holden[1], Micheal Adams[1], Heidi-Lynn Ploeg[1]
[1]*Queen's University*

1:56pm - 2:08pm

O6.3.3 - A critical evaluation of cortical bone fracture toughness testing methods

Daniel Dapaah[1], Thomas Willett[1]
[1]*University of Waterloo*

2:09pm - 2:21pm

O6.3.4 - Passive force enhancement is not abolished by muscle shortening

Shuyue Liu[1], Heron Medeiros[2], Heiliane de Brito Fontana[2], Walter Herzog[1]
[1]*University of Calgary*, [2]*Federal University of Santa Catarina*

2:22pm - 2:34pm

O6.3.5 - Fracture of blood clot: effects of loading rate, red blood cell and platelet

Shiyu Liu[1], Farshid Ghezelbash[1], Aram Bahmani[1], Zhen Yang[1], Zhenwei Ma[1], Guangyu Bao[1], Jianyu Li[1]
[1]*McGill University*

2:35pm - 2:47pm

O6.3.6 - Effects of cement line geometry & properties on XFEM crack propogation in trabeculae

Pavel Rahovich[1], Krishna Challagulla[1], Brent Lievers[1]
[1]*Laurentian University*

2:48pm - 3:00pm

O6.3.7 - Effect of MitraClip on mitral valve leaflet stresses and chordal forces in functional mitral regurgitation repair

Gediminas Gaidulis[1], Muralidhar Padala[1]
[1]*Emory University*

Room 201

O6.4 – UPPER LIMB 1 - SHOULDER

Session Moderator: **Kate Saul**, *North Carolina State University &*
Michael Holmes, *Brock University*

1:30pm - 1:42pm

O6.4.1 - Similar strength deficits exist in patients with eccentric and concentric glenohumeral osteoarthritis

Margaret Coats-Thomas[1], Emma Baillargeon[2], Daniel Ludvig[1], Constantine Nicolozakes[1], Guido Marra[1], Eric Perreault[1], Amee Seitz[1]
[1]*Northwestern University,* [2]*University of Pittsburgh*

1:43pm - 1:55pm

O6.4.2 - Muscle torque generator model for a two degree-of-freedom shoulder joint

Sydney Bell[1], John McPhee[1]
[1]*University of Waterloo*

1:56pm - 2:08pm

O6.4.3 - Deltoid muscle drives movement compensation after a severe rotator cuff tear

Joshua Pataky[1], Lyndsay Engle[1], Vijitha Seelam[1], Sujata Khandare[1], Zoe Moore[1], April Armstrong[1], Meghan Vidt[1]
[1]*Pennsylvania State University*

2:09pm - 2:21pm

O6.4.4 - Computational Modeling of Glenohumeral Contact and Translation

Morgan Dalman[1], Katherine Saul[1]
[1]*North Carolina State University*

2:22pm - 2:34pm

O6.4.5 - Effort and stiffness considerations for emergent shoulder muscle activity patterns

Daanish Mulla[1], Peter Keir[1]
[1]*McMaster University*

2:35pm - 2:47pm

O6.4.6 - Normalization of shoulder complex kinematics after rotator cuff repair

Alyssa Schnorenberg[1], Dara Mischkel[2], Steven Grindel[2], Brooke Slavens[1]
[1]*University of Wisconsin,* [2]*Medical College of Wisconsin*

2:48pm - 3:00pm

O6.4.7 - Predictive model from factorial analysis of factors affecting glenoid baseplate micromotion in reverse shoulder arthroplasty

Kenna Bartlett[1], Kevin Nguyen[1], Lawrence Torkan[1], J. Timothy Bryant[1], Ryan Bicknell[1], Heidi-Lynn Ploeg[1]

[1]*Queen's University*

Room 207/208

O6.5 – WEARABLE SENSORS 1

Session Moderator: **Xavier Robert-Lachaine**, *IRSST &*
Peter Adamczyk, *University of Wisconsin*

1:30pm - 1:42pm

O6.5.1 - Characterization of terrain slope using joint angle principal components and hierarchical clustering

Sara Harper[1], Jack Martin[1], Peter Adamczyk[1], Darryl Thelen[1]

[1]*University of Wisconsin*

1:43pm - 1:55pm

O6.5.2 - Fusion of video and imu data via dynamic optimization of a biomechanical model

Owen Pearl[1], Ashwin Godura[1], Sarah Bergbreiter[1], Eni Halilaj[1]

[1]*Carnegie Mellon University*

1:56pm - 2:08pm

O6.5.3 - Using OpenSim to validate and compare IMU-based kinematic estimation methods

Michael Potter[1], Stephen Cain[2], Lauro Ojeda[3], Reed Gurchiek[4], Ryan McGinnis[5], Noel Perkins[3]

[1]*Francis Marion University,* [2]*West Virginia University,* [3]*University of Michigan,* [4]*Stanford University,* [5]*University of Vermont*

2:09pm - 2:21pm

O6.5.4 - Using consumer-grade wearable sensors to predict Achilles tendon force during running

John Davis[1], Stacey Meardon[2], Allison Gruber[1]

[1]*Indiana University School of Public Health,* [2]*East Carolina University*

2:22pm - 2:34pm

O6.5.5 - Understanding Compliance for Consumer-Grade Wearables: A Case Study using Fitbit Data

Loubna Baroudi[1], Stephen Cain[2], Ronald Zernicke[1], Sung Won Choi[1], Muneesh Tewari[1]

[1]*University of Michigan,* [2]*West Virginia University*

2:35pm - 2:47pm

O6.5.6 - Evaluating how well markerless motion capture approaches measure trunk kinematics

Jacob Banks[1], Joanna James[2], Andrew Lynch[2], Andrew White[1], Dennis Anderson[1]

[1]*BIDMC / Harvard Medical School,* [2]*BIDMC*

2:48pm - 3:00pm

O6.5.7 - Estimation of Arm Elevation through Wearable Technology across Simulated Work Tasks

Jacklyn Kurt[1], Caitlyn Mei[1], Vignesh Sivan[1], Clark Dickerson[1], Stewart McLachlin[1]
[1]*University of Waterloo*

3:00pm – 3:30pm
Foyer

BREAK

3:30pm – 5:00pm
Room 214

SESSION 7

S10 - Breaking down the hierarchy: understanding the many length scales of bone

Sarah Manske[1], Mariana Kersh[2], Glen Niebur[3], Natalie Reznikov[4]
[1]*University of Calgary*, [2]*University of Illinois Urbana-Champaign*, [3]*University of Notre Dame*, [4]*McGill University*

Room 203

O7.1 – ANIMAL MODELS AND COMPARATIVE BIOLOGY

Session Moderator: **Jacque Cole**, *North Carolina State University &*
Michael Rainbow, *Queen's University*

3:30pm - 3:42pm

O7.1.1 - Heads or tails: Where should a fish store extra mass to maximize its jump distance?

Kazem Alambeigi[1], Emily Standen[1], Thomas Uchida[1]
[1]*University of Ottawa*

3:43pm - 3:55pm

O7.1.2 - Developmental plasticity of walking energetics and swing-phase mechanics in chronically limb-loaded fowl

Kavya Katugam[1], Talayah Johnson[2], Ian Dechene[1], Suzanne Cox[3], Stephen Piazza[1], Jonas Rubenson[1]
[1]*Pennsylvania State University*, [2]*University of Pennsylvania*, [3]*Duke University*

3:56pm - 4:08pm

O7.1.3 - Comparing active contractile properties within an integrated group of muscles: the abdominal wall

Aliza Siebenaller[1], Alex Noonan[1], Stephen Brown[1]
[1]*University of Guelph*

4:09pm - 4:21pm

O7.1.4 - Investigating the effects of a gradual VCD-induced ovarian failure model of perimenopause on muscle contractility in single fibres of female mice

Parastoo Mashouri[1], Jinan Saboune[1], Glen Pyle[1], Geoffrey Power[1]
[1]*University of Guelph*

4:22pm - 4:34pm

O7.1.5 - How muscle forces impact tendon strain during locomotion: a direct comparison of in-vivo and in-vitro tendon properties in sheep

Fransiska Bossuyt[1], Timothy Leonard[1], Andrew Sawatsky[1], W. Michael Scott[1], Walter Herzog[1]
[1]*University of Calgary*

4:35pm - 4:47pm

O7.1.6 - Changes in rodent gait kinematics at different walking velocities

Brody Hicks[1], Jack Dienes[1], George Christ[1], Shawn Russell[1]
[1]*University of Virginia*

4:48pm - 5:00pm

O7.1.7 - Neuromuscular control strategies in walking versus running on uneven terrain

Marie Janneke Schwaner[1], Joanne Gordon[2], Andrew Biewener[3], Monica Daley[1]
[1]*University of California,* [2]*Royal Veterinary College,* [3]*Harvard University*

Room 207/208

O7.2 – ARTIFICIAL INTELLIGENCE

Session Moderator: **Amin Komeili**, *University of Calgary &*
Eni Halilaj, *Carnegie Mellon University*

3:30pm - 3:42pm

O7.2.1 - Predicting knee adduction moment response to gait retraining

Nataliya Rokhmanova[1], Katherine Kuchenbecker[2], Peter Shull[3], Reed Ferber[4], Eni Halilaj[1]
[1]*Carnegie Mellon University,* [2]*Max Planck Institute for Intelligent Systems,* [3]*Shanghai Jiao Tong University,* [4]*University of Calgary*

3:43pm - 3:55pm

O7.2.2 - Opening the black box: Using explainable AI to understand what a neural network learns from lateral pinch simulations

Kalyn Kearney[1], Joel Harley[1], Jennifer Nichols[1]
[1]*University of Florida*

3:56pm - 4:08pm

O7.2.3 - Examining machine learning classifications with explainable AI aids interpretation of wrist biomechanics

Isaly Tappan[1], Erica Lindbeck[1], Jennifer Nichols[1], Joel Harley[1]
[1]*University of Florida*

4:09pm - 4:21pm

O7.2.4 - Ground reaction force estimation from wearable sensors during free running

Seth Donahue[1], Michael Hahn[1]
[1]*University of Oregon*

4:22pm - 4:34pm

O7.2.5 - Multi-dimensional dynamic time warping distance based approach for the recognition of high knee flexion postures in inertial sensor data

Annemarie Laudanski[1], Arne Küderle[2], Felix Kluge[2], Bjoern Eskofier[2], Stacey Acker[1]
[1]*University of Waterloo,* [2]*Friedrich-Alexander Universität*

4:35pm - 4:47pm

O7.2.6 - Estimation of knee adduction moment during walking using wearable sensor data with an optimized sequence-based artificial recurrent neural network

Yu-Pin Liang[1], Li-Shan Chou[1]
[1]*Iowa State University*

4:48pm - 5:00pm

O7.2.7 - A random forest regression to predict joint angles across various gait phases

David Hollinger[1], Michael Zabala[1]
[1]*Auburn University*

Room 215

O7.3 – FOOTWEAR/FEET

Session Moderator: **Wouter Hoogkamer**, *University of Massachusetts &* **Laura Healey**, *PUMA Group*

3:30pm - 3:42pm

O7.3.1 - The effects of shoe-sole stiffness on sprint-cycling performance

Ross Wilkinson[1], Nell Crosby[1], Rodger Kram[1]
[1]*University of Colorado*

3:43pm - 3:55pm

O7.3.2 - Boa-enabled performance fit wrap uppers improve power transfer during submaximal and sprinting in road cycling

Bethany Kilpatrick[1], Kathryn Harrison[1], Eric Honert[1], Daniel Feeney[1]
[1]*BOA Technology*

3:56pm - 4:08pm

O7.3.3 - Automated three-dimensional distance and coverage mapping in the presence of hallux valgus

Andrew Behrens[1], Kepler Carvalho[1], Matthieu Lalevee[1], Nacime Mansur[1], Cesar de Netto[1], Kevin Dibbern[1]
[1]*University of Iowa Orthopedic Functional Imaging Research Laboratory*

4:09pm - 4:21pm

O7.3.4 - A Soft 3-Dimensional Force Sensor for In-Shoe Ground Reaction Force Measurement

Jonathan Miller[1], Andrew Miller[2], Lance Frazer[3], Tylan Templin[3], Travis Eliason[3], Cory Berkland[1]
[1]*University of Kansas,* [2]*Axioforce, LLC,* [3]*Southwest Research Institute*

4:22pm - 4:34pm

O7.3.5 - Comparison of incline vs block heel-raise exercise training on vertical jump

Torstein Daehlin[1], Loren Chiu[1]
[1]*University of Alberta*

4:35pm - 4:47pm

O7.3.6 - Single-segment, multi-segment, and planar angle foot kinematic data for classifying autistic gait patterns in children

Ashirbad Pradhan[1], Karansinh Padhiar[1], Victoria Chester[1]
[1]*University of New Brunswick*

4:48pm - 5:00pm

O7.3.7 - The effects of walking speed on multisegment foot kinematics

Nayeli Marcial[1], Usha Kuruganti[1], Victoria Chester[1]
[1]*University of New Brunswick*

Room 205/206

O7.4 – MUSCULOSKELETAL MODELLING & SIMULATION 2

Session Moderator: **Allison Clouthier**, *University of Ottawa &*
Anthony Gatti, *Stanford University*

3:30pm - 3:42pm

O7.4.1 - Reconstruction of patient-specifc tibiofemoral joint articulations from marker trajectories and anthropometrics

Claire Warren[1], Michele Conconi[2], Nicola Sancisi[2], Allison Clouthier[1], Sasha Carsen[3], Daniel Benoit[1]
[1]*University of Ottawa,* [2]*University of Bologna,* [3]*Children's Hospital of Eastern Ontario*

3:43pm - 3:55pm

O7.4.2 - Creating personalized thumb models from sparse simulation datasets using deep learning

Erica Lindbeck[1], Maximillian Diaz[1], Jennifer Nichols[1], Joel Harley[1]
[1]*University of Florida*

3:56pm - 4:08pm

O7.4.3 - The Effect of Subtalar Joint Axis Definition on Muscle Moment Arms of the Foot

Julia Noginova[1], Hunter Bennett[2], Stacie Ringleb[2]
[1]*Naval Medical Center Portsmouth,* [2]*Old Dominion University*

4:09pm - 4:21pm

O7.4.4 - Measuring and modeling in vivo human gracilis passive tension

Lomas Persad[1], Benjamin Binder-Markey[2], Alexander Shin[1], Richard Lieber[3], Kenton Kaufman[1]
[1]*Mayo Clinic,* [2]*Drexel University,* [3]*Shirley Ryan Ability Lab*

4:22pm - 4:34pm

O7.4.5 - Elasticity tensor approximation applied to a finite element muscle model

Manuel Lucas Sampaio de Oliveira[1], Thomas Uchida[1]
[1]*University of Ottawa*

4:35pm - 4:47pm

O7.4.6 - The Aging Achilles Tendon: Model-Predicted Changes in Calf Muscle Neuromechanics

Maggie Wagner[1], William Clark[2], Jason Franz[1]
[1]*University of North Carolina,* [2]*Brown University*

4:48pm - 5:00pm

O7.4.7 - A 3D modeling exploration into quantifying soleus muscle stiffness

Katherine Knaus[1], Silvia Blemker[2]
[1]*University of California San Diego,* [2]*University of Virginia*

Room 201

THEMATIC POSTER SESSION 3 - EXPLAINING LOCOMOTION COSTS

Session Moderator: **Alena Grabowski**, *University of Colorado Boulder &* **Jessica Selinger**, *Queen's University*

TP3.1 Stride-by-Stride Variability Impacts on Running Economy

Iain Hunter[1], Jared Steele[1], Kaleigh Renninger[1], Cameron Weeks[1]

[1]*Brigham Young University*

TP3.3 Metabolic Cost and Vigor in Human Gait

Matthew Mulligan[1], Brian Umberger[1]

[1]*University of Michigan*

TP3.4 On the achilles tendon moment arm length and the force-length-velocity relationship during running

Eric Bennett[1], Jared Fletcher[1]

[1]*Mount Royal University*

TP3.5 Effects of Induced Motor Fatigue on Walking Mechanics and Energetics

Pei-Chun Kao[1], Colin Lomasney[1], Amie Russell[1]

[1]*University of Massachusetts Lowell*

TP3.6 How humans adapt stepping to perform lateral maneuvers

David Desmet[1], Joseph Cusumano[1], Jonathan Dingwell[1]

[1]*Penn State University*

5:00pm – 7:00pm
Foyer, Rooms 202, 209, and 210

POSTER SESSION 2

Review the posters, discuss with poster presenters and enjoy some light snacks.

7:00pm – 10:30pm
Room 214

Women in Science Event: Elevating and Championing each other through sponsorship

Sponsored by **Novel**

How can we communicate, connect, and inspire confidence for women and under-represented genders within the biomechanics community? At every career stage, sponsors play a critical role in publicly acknowledging achievements, advocating, and generally using their power and privilege to help their mentees. At this workshop, we will have interactive roundtable discussions addressing topics from finding sponsors to acknowledging bias as a sponsor. Attendees will leave with actionable ways that they can be a better sponsor (at any career stage) for the biomechanics community.

DAY 5 Thursday August 25, 2022

8:00am – 9:00am
Gatineau Salon

KEYNOTE LECTURE 4

Moving toward better osteoarthritis outcomes with patient-oriented biomechanics research

Kharma Foucher, *University of Illinois at Chicago*

9:00am – 9:30am
Foyer

BREAK

9:30am – 11:00pm

SESSION 8

Room 214

S11 - Balance control following concussion and traumatic brain injury

David Howell[1], Kathryn Schneider[2], Li-Shan CHou[3], Pinata Sessoms[4]

[1]University of Colorado, [2]University of Calgary, [3]Iowa State University, [4]Naval Health Research Center / San Diego State University

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Room 215

O8.1 – MOTION ANALYSIS/METHODS

Session Moderator: Michael Hunt, *University of British Columbia*

9:30am - 9:42 am

O8.1.1 - A Comparison Of Force Plate-Based Center Of Mass Estimation Algorithms

Alexandre Banks[1], Rose He[1], Luke Dillman[1], Chris McGibbon[1], Jon Sensinger[1]

[1]University of New Brunswick

9:43am - 9:55 am

O8.1.2 - Transforming gait: Deep learning powered spatiotemporal video gait analysis

R. James Cotton[1], Emoonah McClerklin[1], Anthony Cimorelli[1], Ankit Patel[1], Tasos Karakostas[1]

[1]Shirley Ryan AbilityLab / Northwestern University

9:56am - 10:08 am

O8.1.3 - A Generalised Smoothing Approach for Continuous, Planar, Inverse Kinematics Problems.

Andrew Pohl[1], Matthew Schofield[2], Reed Ferber[1]

[1]University of Calgary, [2]Univeristy of Otago

10:09am - 10:21 am

O8.1.4 - Can body segment angles during common manual wheelchair user movements be calculated from linear acceleration data

Stephen Cain[1], Meegan Van Straaten[2], Sydney Lundell[2], Kathylee Pinnock Branford[1], Omid Jahanian[2], Melissa Morrow[2]

[1]West Virginia University, [2]Mayo Clinic

10:22am - 10:34 am

O8.1.5 - Fast 3-D Motion Tracking With Noisy Video and IMU Data

Soyong Shin[1], Eni Halilaj[1]

[1]Carnegie Mellon University

10:35am - 10:47 am

O8.1.6 - Joint kinetics assessment using high speed biplanar videoradiography and motion capture

Gregor Kuntze[1], Tomasz Bugajski[1], Harry Han[1], Emily Bishop[1], Ryan Baxter[1], Janet Ronsky[1]

[1]University of Calgary

10:48am - 11:00 am

O8.1.7 - Assessing time varying lumbar flexion-extension kinematics using automated pose estimation.

Paul Goncharow[1], Shawn Beaudette[1]

[1]Brock University

Room 201

O8.2 – MOVEMENT DISORDERS

Session Moderator: **Angelica Lang**, *University of Saskatchewan &* **Kim Duffy**, *Vicon*

sponsored by **Vicon**

9:30am - 9:42 am

O8.2.1 - Combined audiovisual and haptic biofeedback supports plantarflexor recruitment in individuals with cerebral palsy

Alyssa Spomer[1], Benjamin Conner[2], Michael Schwartz[3], Zachary Lerner[4], Katherine Steele[1]

[1]University of Washington, [2]University of Arizona - College of Medicine, [3]Gillette Children's Specialty Healthcare, [4]Northern Arizona University

9:43am - 9:55 am

O8.2.2 - Treadmill handrail use increases paretic side margin of stability in individual's post-stroke

Oluwaseye Odanye[1], Emily Steffensen[1], Erica Hinton[1], Samuel Bierner[1], HaoYuan Hsiao[2], Brian Knarr[1]

[1]University of Nebraska, [2]University of Texas

9:56am - 10:08 am

O8.2.3 - Frontal-plane deviations and spatiotemporal asymmetry are energy-optimal in simulated hemiparetic gait

Russell Johnson[1], James Finley[1]

[1]University of Southern California

10:09am - 10:21 am

O8.2.4 - Limb-specific postural instability during quiet stance and its relation with weight distribution in children with cerebral palsy

Sydni Whitten[1], Katelyn Campbell[1], Karl Newell[1], Li Li[2], Gavin Colquitt[2], Christopher Modlesky[1]

[1]University of Georgia, [2]Georgia Southern University

10:22am - 10:34 am

O8.2.5 - Relative Foot Position Visual Feedback During Walking in Pediatric Cerebral Palsy

Erik Hummer[1], Melvin Mejia[1], Xuan Liu[1], Peter Barrance[1]
[1]*Kessler Foundation*

10:35am - 10:47 am

O8.2.6 - Three-Dimensional gait pattern in children: comparing typically developing and hypermobile Ehlers-Danlos Syndrome

Anahita Qashqai[1], Hyo Jung Jeong[2], Samantha Schwartz[1], Michael Muriello[3], Donald Basel[3], Brooke Slavens[1]
[1]*University of Wisconsin,* [2]*Marquette University,* [3]*Medical College of Wisconsin*

10:48am - 11:00 am

O8.2.7 - Is crouch gait advantageous in the presence of plantarflexor contracture?

Elijah Kuska[1], Katherine Steele[1], Michael Schwartz[2], Naser Mehrabi[1]
[1]*University of Washington,* [2]*Gillette Children's Specialty Healthcare*

Room 205/206

O8.3 – ORTHOPAEDIC BIOMECHANICS

Session Moderator: Tim Burkhart, *University of Toronto &*
Kharma Foucher, *University of Illinois at Chicago*

9:30am - 9:42 am

O8.3.1 - Femoral and acetabular features explain acetabular contact pressure sensitivity to hip internal rotation in persons with cam morphology: A finite element analysis

Jordan Cannon[1], Jeffery Rankin[2], Kristi Lewton[1], Christopher Powers[1]
[1]*University of Southern California,* [2]*Rancho Research Institute*

9:43am - 9:55 am

O8.3.2 - Effect of hip preservation surgery on level and sloped walking biomechanics

Brandon Nunley[1], Avneesh Chhabra[1], Ajay Kohli[1], Edward Mulligan[1], Emily Middleton[1], Joel Wells[1], Nicholas Fey[1]
[1]*University of Texas*

9:56am - 10:08 am

O8.3.3 - Ankle biomehcnaics of paitents with tka during uphill walking

Songning Zhang[1], Sean Briwn[1], Kaileigh Estler[1], Walter Menke[1], Chen Wen[1], Harold Cates[2]
[1]*University of Tennessee,* [2]*Tennessee Orthopedic Clinic*

10:09am - 10:21 am

O8.3.4 - Quantifying the pressure and force distribution on the perineal region during hip arthroscopy when using a perineal post: A potental mechansms of pudendal nerve palsy

Nadeem Mamajiwala[1], Graeme Hoit[1], Jaskarndip Chahal[1], Tim Dwyer[1], Shgufta Docter[1], Jordan Farag[1], Daniel Whelan[1], Timothy Burkhart[1]
[1]*University of Toronto*

10:22am - 10:34 am

O8.3.5 - Biomechanical testing of vertebral body tethering using bio-robotic system

Daniel Jacobson[1], Alexander Hooke[1], A'nna Kelly[1], James Fitzsimmons[1], Chunfeng Zhao[1], A. Noelle Larson[1], Todd Milbrandt[1]

[1]Mayo Clinic

10:35am - 10:47 am

O8.3.6 - Sex-based differences in hip joint muscle and contact forces during walking in people with hip cartilage degeneration

Michael Samaan[1], Thomas Link[2], Sharmila Majumdar[2], Richard Souza[2]

[1]University of Kentucky, [2]University of California-San Francisco

10:48am - 11:00 am

O8.3.7 - Predicting Post-Operative Walking Speed Based on Pre-Operative Gait Mechanics

Kristen Renner[1], Cherice Hill[2], Caitlyn Delaney[3], Laura Sands[4], Robin Queen[4]

[1]University of Arizona, [2]Clemson University, [3]Radford University, [4]Virginia Tech

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Room 203

O8.4 – SPORTS INJURIES 2 – HEAD TRAUMA

Session Moderator: **Thomas Buckley**, *University of Delaware &*
David Pearsall, *McGill University*

9:30am - 9:42 am

O8.4.1 - Brain trauma exposure for American tackle football players 5 to 9 and 9 to 14 years of age

Amirhossein Azadi[1], Amirhossein Azadi[1], Clara Karton[1], David Koncan[1], Michael Gilchrist[2], Blaine Hoshizaki[1]

[1]University of Ottawa, [2]University College Dublin

9:43am - 9:55 am

O8.4.2 - Influence of play type on the magnitude and number of head impacts sustained in youth American football

Parisa Dehghan[1], Adam Vale[1], Andrew Post[1], Janie Cournoyer[1], T. Blaine Hoshizaki[1], Michael D. Gilchrist[2]

[1]University of Ottawa, [2]University College Dublin

9:56am - 10:08 am

O8.4.3 - Head Impact Kinematics during a Bobsled World Cup: A Pilot Study

April McPherson[1], William Adams[1], Jonathan Finnoff[1]

[1]United States Olympic & Paralympic Committee

10:09am - 10:21 am

O8.4.4 - Dynamics of head-to-shielding impacts in ice hockey

Omid Vakili[1], Olivia Aguiar[1], Max Donelan[1], Thomas Hoshizaki[2], Stephen Robinovitch[1]

[1]Simon Fraser University, [2]University of Ottawa

10:22am - 10:34 am

O8.4.5 - Effect of filtering on the agreement between GFT helmet mounted sensors and hybrid-III measures of head kinematics in body-to-head impacts in hockey

Jeremiah Zacharias[1], Olivia Aguiar[1], Omid Vakili[1], Stephen Robinovitch[1]
[1]*Simon Fraser University*

10:35am - 10:47 am

O8.4.6 - Design of a Honeycomb-like Bicycle Helmet for Prevention of Traumatic Brain Injury

Annie King[1], Adam Tyedmers[1], Sarah Gonder[1], Bosco Yu[1], Cheryl Quenneville[1]
[1]*McMaster University*

10:48am - 11:00 am

O8.4.7 - Identifying predictive variables for levels of Brain Trauma in Youth Ice Hockey

Thomas Hoshizaki[1], Andrew Post[2], Clara Karton[2], Michael Robidoux[2], Blaine Hoshizaki[2], Michael Gilchrist[3]
[1]*University of Waterloo*, [2]*University of Ottawa*, [3]*University College Dublin*

Room 207/208

O8.5 – TRUNK & SPINE 2

Session Moderator: **Dennis Anderson**, *Harvard University*

9:30am - 9:42 am

O8.5.1 - Two Determinants Affecting the Link between Injury and Nociception in the Low Back

Daniel Viggiani[1], Fasih Ahmad Rahman[1], Jeffery Barrett[1], Joe Quadrilatero[1], Jack Callaghan[1]
[1]*University of Waterloo*

9:43am - 9:55 am

O8.5.2 - Brain activation during direct musculoskeletal sensory stimulation of the trunk

Sheri Silfies[1], Jennifer Vendemia[1], Courtney Butowicz[1]
[1]*University of South Carolina*

9:56am - 10:08 am

O8.5.3 - Head supported mass, moment of inertia, neck loads and stability: a simulation study

Jeff Barrett[1], Laura Healey[2], Colin McKinnon[3], Andrew Laing[1], Clark Dickerson[1], Steven Fischer[1], Jack Callaghan[1]
[1]*University of Waterloo*, [2]*Puma SE Innovation Inc.*, [3]*3MotionAI Inc.*

10:09am - 10:21 am

O8.5.4 - A Comparison of Feedforward Methods for Control of the Trunk after SCI

Aidan Friederich[1], Musa Audu[1], Ronald Triolo[1]
[1]*Case Western Reserve University*

10:22am - 10:34 am

O8.5.5 - Porcine versus human cadaver vertebral joint properties: a comparison of rotational and translational neutral zone characteristics

Kayla Fewster[1], Jackie Zehr[2], Jack Callaghan[2]
[1]*University of British Columbia*, [2]*University of Waterloo*

10:35am - 10:47 am

O8.5.6 - Estimated Muscle Group Forces are Sensitive to Modeled Muscle Geometric Complexity

Jordan Sturdy[1], Pinata Sessoms[2], Anne Silverman[1]
[1]*Colorado School of Mines*, [2]*Naval Health Research Center*

10:48am - 11:00 am

O8.5.7 - The impact of head-mounted display design for VR/AR on cervical spine loading

Amanda Astrologo[1], Sarah Nano[1], Elizabeth Klemm[1], Sandra Shefelbine[1], Jack Dennerlein[1]
[1]*Northeastern University*

11:00am – 11:30am
Foyer

BREAK

11:30am - 1:00pm

SESSION 9

Room 207/208

S12 - Challenges and advances in the use of wearable sensors for lower extremity biomechanics

Stephen Cain[1], Jocelyn Hafer[2], Carolin Curtze[3], Reed Gurchiek[4], Peter Shull[5], Rachel Vitali[6]
[1]*West Virginia University*, [2]*University of Delaware*, [3]*University of Nebraska at Omaha*, [4]*Stanford University*, [5]*Shanghai Jiao Tong University*, [6]*University of Iowa*

Room 205/206

O9.1 – AGING

Session Moderator: **Stephen Robinovich**, *Simon Fraser University &*
Vicki Komisar, *University of British Columbia*

11:30am - 11:42 am

O9.1.1 - How does aging impact ankle stiffness?

Kristen Jakubowski[1], Daniel Ludvig[1], Sabrina Lee[1], Eric Perreault[1]
[1]*Northwestern University*

11:43am - 11:55 am

O9.1.2 - Altered muscular coherence is evident prior to changes in gait biomechanics

Francesca Wade[1], Yoonjin Choi[1], Rachael Seidler[1], Daniel Ferris[1], Todd Manini[1], David Clark[2], Chris Hass[1], Evangelos Christou[1]
[1]*University of Florida*, [2]*Malcom Randall VA Medical Center/University of Florida*

11:56am - 12:08pm

O9.1.3 - Submaximal Soleus Force Length Characteristics with Aging

Lindsey Trejo[1], Jordyn Schroeder[1], Gregory Sawicki[1]
[1]*Georgia Institute of Technology*

12:09pm - 12:21pm

O9.1.4 - The influence of age on the relationship between step width and spatial and temporal adaptation strategies during split-belt adaptation

Patrick Monaghan[1], Sarah Brinkerhoff[1], Jaimie Roper[1]
[1]*Auburn University*

12:22pm - 12:34pm

O9.1.5 - Assessment of aging related changes in postural control using time to contact

Ross Brancati[1], Jane Kent[1], Kate Hayes[1], Fany Alvarado[1], Katherine Boyer[1]
[1]*University of Massachusetts*

12:35pm - 12:47pm

O9.1.6 - Age effects on lateral stepping adjustments during complex path walking

Meghan Kazanski[1], Joseph Cusumano[1], Jonathan Dingwell[1]
[1]*Pennsylvania State University*

12:48pm - 1:00pm

O9.1.7 - The Circumstances and Consequences of Falls in Long-Term Care Residents

Mayank Kalra[1], Jaimie Killingbeck[2], Andrew Laing[1]
[1]*University of Waterloo*, [2]*Schlegel Villages*

Room 215

O9.2 – SPORT PERFORMANCE

Session Moderator: **Michael Cinelli**, *Wilfrid Laurier University &*
Lori Vallis, *University of Guelph*

11:30am - 11:42 am

O9.2.1 - Kinematic sequence in baseball pitching: a three-dimensional approach

Jun Liu[1], Christopher Knowlton[2], Matthew Gauthier[3], Zach Tropp[4], Antonia Zaferiou[1]
[1]*Stevens Institute of Technology*, [2]*Rush University Medical Center*, [3]*Athletico Physical Therapy*, [4]*Midwest Orthopaedics at Rush*

11:43am - 11:55 am

O9.2.2 - The analysis of forward acceleration asymmetries during on-water sprint kayaking

Joshua Goreham[1], Michel Ladouceur[1]
[1]*Dalhousie University*

11:56am - 12:08pm

O9.2.3 - Sprint kayaker's kinetic asymmetries at increasing stroke rates

Kayla Miller[1], Joshua Goreham[1], Ryan Frayne[1], Michel Ladouceur[1]
[1]*Dalhousie University*

12:09pm - 12:21pm

O9.2.4 - Comparison of Marker-less and Marker-based Motion Capture for Baseball Pitching

Glenn Fleisig[1], Jonathan Slowik[1], Derek Wassom[2], Jasper Bishop[1], Alek Diffendaffer[3], Yuki Yanagita[1]
[1]*American Sports Medicine Institute*, [2]*Dari Motion*, [3]*San Francisco Giants*

12:22pm - 12:34pm

O9.2.5 - Shoulder-trunk coordination and sequencing during slap shots in ice hockey players

Shawn Robbins[1], Philippe Renaud[1], Neil MacInnis[2], David Pearsall[1]
[1]*McGill University,* [2]*Curv Health*

12:35pm - 12:47pm

O9.2.6 - Neuromuscular control of lower limb muscles during high cadence cycling

Brett Still[1], Alexander Willmott[1], Steven Lindley[2], David Mullineaux[1], Franky Mulloy[1]
[1]*University of Lincoln,* [2]*Delsys Europe*

12:48pm - 1:00pm

O9.2.7 - Serve knee flexion contributes to serve speed of junior tennis players

Joana F. Hornestam[1], Thales Souza[2], Fabrício Magalhães[2], Mickäel Begon[3], Sérgio Fonseca[2]
[1]*University of Ottawa,* [2]*Universidade Federal de Minas Gerais,* [3]*University of Montreal*

Room 214

O9.3 – TISSUE MECHANICS 3

Session Moderator: **Allison Clouthier**, *University of Ottawa &*
Laura Welte, *University of Wisconsin*

11:30am - 11:42 am

O9.3.1 - An Automatic Knee Joint Geometry Construction From MRI

Reza Kakavand[1], Mehrdad Palizi[2], Olivia Bruce[1], Samer Adeeb[2], Brent Edwards[1], Amin Komeili[1]
[1]*University of Calgary,* [2]*University of Alberta*

11:43am - 11:55 am

O9.3.2 - Development of Multi-Bundle Virtual Ligaments to Simulate Knee Mechanics After Total Knee Arthroplasty

Samira Vakili[1], Brent Lanting[1], Alan Getgood[1], Ryan Willing[1]
[1]*Western University*

11:56am - 12:08pm

O9.3.3 - Age-related reductions in Achilles tendon stiffness persist at matched triceps surae activations

Rebecca Krupenevich[1], Gregory Sawicki[2], Jason Franz[1]
[1]*University of North Carolina,* [2]*Georgia Institute of Technology*

12:09pm - 12:21pm

O9.3.4 - Estimation of patellar tendon load during bilateral and unilateral movements in young adults

Matthew Beerse[1], Breven Perry[1], Allison Kinney[1], Joaquin Barrios[1]
[1]*University of Dayton*

12:22pm - 12:34pm

O9.3.5 - Squat exercise variations require unique three-dimensional hip muscle strategies

Zachary Fielding[1], Loren Chiu[1]
[1]*University of Alberta*

12:35pm - 12:47pm

O9.3.6 - Validation of [18F]NaF PET as a measure of bone remodeling using finite element analysis

Anthony Gatti[1], Bryan Haddock[1], Ryan Alcantara[2], Sarah St. Pierre[2], Mathias Peirlinck[3], Scott Uhlrich[2], Ellen Kuhl[2], Charlotte Suetta[4], Garry Gold[2], Akshay Chaudhari[2], Jennifer Hicks[2], Scott Delp[2], Feliks Kogan[2]

[1]Copenhagen University Hospital, [2]Stanford University, [3]Delft University of Technology, [4]Copenhagen University Hostpital

12:48pm - 1:00pm

O9.3.7 - A novel ultrasound protocol for measuring soft tissue thickness over the femur

Alyssa Tondat[1], Becky Knarr[1], Sukirat Bhullar[1], Andrew Laing[1]

[1]University of Waterloo

Room 203

O9.4 – UPPER LIMB 2

Session Moderator: **Clark Dickerson**, *University of Waterloo &*
Wendy Murray, *Northwestern University*

11:30am - 11:42 am

O9.4.1 - Carpal tunnel volume distribution and morphology changes with flexion-extension and radial-ulnar deviation

Drew Anderson[1], Michele Oliver[1], Karen Gordon[1]

[1]University of Guelph

11:43am - 11:55 am

O9.4.2 - Different aspects of hand grip performance may be explained by connectivity of distinct sensorimotor networks in chronic stroke

Christian Schranz[1], Shraddha Srivastava[1], Bryant Seamon[1], Babara Marebwa[2], Leonardo Bonilha[1], Viswanathan Ramakrishnan[1], Janina Wilmskoetter[1], Richard Neptune[1], Steve Kautz[1], Na Jin Seo[1]

[1]Medical University of South Carolina, [2]The Michael J Fox Foundation

11:56am - 12:08pm

O9.4.3 - The effect of forearm crutch length on upper limb kinematics

Amanda Chen[1], Gregor Kuntze[1], Janet Ronsky[1], Ranita Manocha[1]

[1]University of Calgary

12:09pm - 12:21pm

O9.4.4 - Quantification of elbow spasticity (preliminary results)

Yinan Pei[1], Yiyue Feng[2], Seung Yun Song[1], Tao Liu[2], Christopher Zallek[3], Elizabeth Hsiao-Wecksler[1]

[1]University of Illinois, [2]Zhejiang University, [3]OSF Healthcare

12:22pm - 12:34pm

O9.4.5 - IMU-Derived Metrics of Repetitive Arm Motion in the Community Environment for Manual Wheelchair Users

Omid Jahanian[1], Meegan Van Straaten[1], Jasmine Nakum[2], Sydney Lundell[1], Kathylee Pinnock Branford[3], Stephen Cain[3], Melissa Morrow[1]

[1]Mayo Clinic, [2]University of Wisconsin, [3]West Virginia University

12:35pm - 12:47pm

O9.4.6 - Characterizing shoulder-related quality of life in breast cancer survivors: a cluster analysis

Jacquelyn Maciukiewicz[1], Clark Dickerson[1]
[1]*University of Waterloo*

12:48pm - 1:00pm

O9.4.7 - Changes in pectoralis major stiffness and thickness over the first 12 months after radiotherapy for breast cancer

Susann Wolfram[1], James Hayman[1], Lori Pierce[1], Reshma Jagsi[1], David Lipps[1]
[1]*University of Michigan*

1:00pm – 2:15pm
Foyer

LUNCH

Grab a lunch box, visit an exhibitor, explore the outside!

1:00pm – 2:00pm
Room 214

AMERICAN BASEBALL BIOMECHANICS SOCIETY ANNUAL BUSINESS MEETING

ABBS members and any individuals attending NACOB who are interested in learning more about research related to baseball biomechanics are invited to attend.

2:15pm – 3:45pm
Room 214

SESSION 10

S13 – Pediatric orthopaedic biomechanics

Room 215

O10.1 – LOCOMOTION 3

Session Moderator: **Abigail Schmitt**, *University of Arkansas*

2:15pm - 2:27pm

O10.1.1 - Navigating negative consequences during obstacle crossing

Isabella Champenois[1], Ashlyn Jendro[1], Jessica Passarelli[1], Tiphanie Raffegeau[2], Abigail Schmitt[1]
[1]*University of Arkansas*, [2]*Ohio University*

2:28pm - 2:40pm

O10.1.2 - Test-retest reliability of transient balance features across sensory, cognitive, and stance perturbations

Ksithij Nandishwara[1], Nicholas Benson[1], Gregory Freisinger[2], Janet Simon[3], Kimberly Bigelow[4], Scott Monfort[1]
[1]*Montana State University*, [2]*United States Military Academy*, [3]*Ohio University*, [4]*University of Dayton*

2:41pm - 2:53pm

O10.1.3 - From dwarfs to giants: using predictive musculoskeletal simulations to explore the limits of human locomotor speed with increasing body size

Taylor Dick[1], Friedl De Groote[2], Christofer Clemente[3]
[1]*University of Queensland*, [2]*KU Leuven*, [3]*University of the Sunshine Coast*

2:54pm - 3:06pm

O10.1.4 - Wearable sensors reveal propulsion-based locomotor phenotypes among endurant individuals after stroke

Dheepak Arumukhom Revi[1], Johanna Spangler[1], Stefano De. Rossi[1], William Swift[1], Lillian Ribeirinha-Brage[1], Terry Ellis[1], Conor Walsh[1], Louis Awad[1]

[1]Boston University

3:07pm - 3:19pm

O10.1.5 - Soft robotic exosuit assistance facilitates high intensity gait training after stroke

Anna Roto Cataldo[1], Johanna Spangler[1], Lillian Braga-Ribeirinha[1], Karen Hutchinson[1]

[1]Boston University

3:20pm - 3:32pm

O10.1.6 - The Effect Of Different Types Of Ankle Foot Orthoses On Static And Dynamic Balance

Martin Kilbane[1], Adam Jones[1], Sophia Chirumbole[2], Kimberly Bigelow[1]

[1]University of Dayton, [2]The Ohio State University

3:33pm - 3:45pm

O10.1.7 - Feedback of whole-body motion contributes to perception of locomotor disturbances

Daniel Liss[1], Jessica Allen[1]

[1]West Virginia University

Room 205/206

O10.2 – LOWER LIMB

Session Moderator: **Scott Brandon**, *University of Guelph &*
Elise Laende, *Queen's University*

2:15pm - 2:27pm

O10.2.1 - Investigating the Effect of Subcutaneous Fat Thickness on Surface and Intramuscular-Based Electromyography Signals in the Lower LImb

Matthew Russell[1], Sam Vasilounis[1], Dan Desroches[1], Talia Alenabi[2], Janessa Drake[1], Jaclyn Chopp-Hurley[1]

[1]York University, [2]University of Waterloo

2:28pm - 2:40pm

O10.2.2 - Use of a powered prosthesis increases peak ankle power but not effective foot arc length compared to a passive prosthesis during walking on slopes

Janet Zhang-Lea[1], Hanwen Zhang[2], Alena Grabowski[1]

[1]University of Colorado, [2]Evidation Health

2:41pm - 2:53pm

O10.2.3 - IMU-based estimation of ankle and hip joint centers using an error-state Kalman filter

Michael Potter[1], Stephen Cain[2], Lauro Ojeda[3], Reed Gurchiek[4], Ryan McGinnis[5], Noel Perkins[3]

[1]Francis Marion University, [2]West Virginia University, [3]University of Michigan, [4]Stanford University, [5]University of Vermont

2:54pm - 3:06pm

O10.2.4 - Stoko K1: Supportive apparel to reinterpret lower extremity bracing

Calvin Tse[1], Ryan Bakker[1], Joseph Ardell[1]
[1]*Stoko Design Inc.*

3:07pm - 3:19pm

O10.2.5 - Measuring sagittal knee angle and moment using sensors embedded in a prosthesis

Sabina Manz[1], Thomas Schmalz[2], Veit Schopper[2], Strahinja Dosen[1], Jose Gonzalez-Vargas[2]
[1]*Aalborg University,* [2]*Ottobock SE & Co. KGaA*

3:20pm - 3:32pm

O10.2.6 - Knee flexion angle and vertical ground reaction force predicts knee extension moments during gait after anterior cruciate ligament reconstruction: A longitudinal analysis

Alexa Johnson[1], Riann Palmieri-Smith[1], Chandramouli Krishnan[1]
[1]*University of Michigan*

3:33pm - 3:45pm

O10.2.7 - Acute effects of kneeling exposure on passive frontal plane knee laxity

Kimberly Peckett[1], Daniel Mines[1], Michelle Loo[1], Stacey Acker[1]
[1]*University of Waterloo*

Room 203

O10.3 – UPPER LIMB 3

Session Moderator: **Peter Keir**, *McMaster University &* **Michael Holmes**, *Brock University*

2:15pm - 2:27pm

O10.3.1 - Rapid Upper Limb Assessment of Burkinabe weavers using traditional handlooms

Samuel Brost[1], Amidou Sawadogo[2], Timothy Bryant[1], Genevieve Dumas[1], Qingguo Li[1]
[1]*Queen's University,* [2]*Joseph Ki-Zerbo University*

2:28pm - 2:40pm

O10.3.2 - Median nerve deformation and velocity change in concert during a power grip in the transverse plane of the carpal tunnel

Michelle Campbell[1], Kaylyn Turcotte[1], Gabrielle Racine[1], Michael Holmes[2], Aaron Kociolek[1]
[1]*Nipissing University,* [2]*Brock University*

2:41pm - 2:53pm

O10.3.3 - Perceptions of affordance and kinematics for a lateral manual materials handling task are modified by physical literacy training

Jon Doan[1], Kayla Walker[1], Conor Tosh[1], Dean Stewart[1], Claudia Gonzalez[1]
[1]*University of Lethbridge*

2:54pm - 3:06pm

O10.3.4 - Brain connectivity patterns associated with different aspects of motor performance

Adam Baker[1], Christian Schranz[1], Na Jin Seo[1]
[1]*Medical University of South Carolina*

3:07pm - 3:19pm

O10.3.5 - Markerless hand motion capture

Nigel Majoni[1], Daanish Mulla[1], Peter Keir[1]
[1]*McMaster University*

3:20pm - 3:32pm

O10.3.6 - The effect of rotator cuff tear severity and external load on aspects of muscle force compensation: A modeling study

Zoe Moore[1], Joshua Pataky[1], Sujata Khandare[1], Meghan Vidt[1]
[1]*Pennsylvania State University*

3:33pm - 3:45pm

O10.3.7 - Impact of post-mastectomy breast reconstruction on pectoralis major stiffness, shoulder strength and self-report function

Mary Jane Bouman[1], Adeyiza Momoh[1], Lipps David[1]
[1]*University of Michigan*

Room 207/208

O10.4 – WEARABLE SENSORS 2

Session Moderator: **Lou Awad**, *Boston University &* **Ashley Collimore**, *Boston University*

2:15pm - 2:27pm

O10.4.1 - Efficacy of in-sole sensors to detect limb loading changes using biofeedback

Ricky Pimentel[1], Cortney Armitano-Lago[1], Brian Pietrosimone[1], Jason Franz[1]
[1]*University of North Carolina*

2:28pm - 2:40pm

O10.4.2 - Comparison of 3-D torso angles using low-cost vs. high-cost IMU

Seung Yun Song[1], Yinan Pei[1], Elizabeth Hsiao-Wecksler[1]
[1]*University of Illinois*

2:41pm - 2:53pm

O10.4.3 - Are 4D Motion Sensors Valid and Reliable for Studying Baseball Pitching?

Stacy Loushin[1], Christopher Camp[1], Kenton Kaufman[1]
[1]*Mayo Clinic*

2:54pm - 3:06pm

O10.4.4 - Smartwatch-based estimation of stride-to-stride gait variability and stability

Christopher Bailey[1], Alexandre Mir-Orefice[1], Thomas Uchida[1], Julie Nantel[1], Ryan Graham[1]
[1]*University of Ottawa*

3:07pm - 3:19pm

O10.4.5 - The number of steps needed to obtain stable variables from real-world walking

Jesse Charlton[1], Calvin Kuo[1], Michael Hunt[1]
[1]*University of British Columbia*

3:20pm - 3:32pm

O10.4.6 - Determining whole-foot ground clearance kinematics by augmenting IMU trajectory with personalized 3D scans

Katherine Fehr[1], Jennifer Bartloff[1], Yisen Wang[1], Katherine Konieczka[1], Julia Mastej[1], Peter Adamczyk[1]

[1]*University of Wisconsin*

3:33pm - 3:45pm

O10.4.7 - Synthesizing Biomechnical Measurements using a Sequential Transformer Model

Paul Quinlan[1], Qingguo Li[1], Xiaodan Zhu[1]

[1]*Queen's University*

Room 201

THEMATIC POSTER SESSION 4 - LOW BACK/ERGONOMICS

Session Moderator: **Rumit Singh**, *Oakland University &*
Cameron Nurse, *Vanderbilt University*

TP4.1 The influence of a soft active exosuit on vertebral loads during lifting

Jacob Banks[1], David Quirk[2], Jinwon Chung[2], Conor Walsh[2], Dennis Anderson[1]

[1]*BIDMC / Harvard Medical School,* [2]*Harvard University*

TP4.2 Kinematic adaptations to limiting lumbar spine flexion across lifting tasks

Danielle Carnegie[1], Steven Hirsch[1], Samuel Howarth[2], Tyson Beach[3]

[1]*University of Toronto,* [2]*Canadian Memorial Chiropractic College,* [3]*University of Waterloo*

TP4.3 The relationship between pain catastrophizing, pain sensitivity, and inter-joint coordination during a lifting task in people with chronic low back pain.

Patrick Ippersiel[1], Richard Preuss[1], Timothy Wideman[1], Shawn Robbins[1]

[1]*McGill University*

TP4.4 Automated control of quasi-passive back exosuits using recurrent neural networks

Laura Elstub[1], Cameron Nurse[1], Paul Slaughter[1], Peter Volgyesi[1], Chad Ice[1], Karl Zelik[1]

[1]*Vanderbilt University*

TP4.6 Should we Estimate Injury Risk Based on Kinematics from a Single Movement Strategy?

Daniel Armstrong[1], Steven Fischer[1]

[1]*University of Waterloo*

3:45pm – 4:15pm
Room 205/206

AWARDS & CLOSING CEREMONY

Join us to hear from the conference co-chairs as well as the announcement of the CSB Masters and Doctoral Awards.

4:15pm – 5:15pm
Room 214

LATINX IN BIOMECHANIX SOCIAL

Come connect and socialize as we wrap up NACOB 2022! Latinx in Biomechanics is a social networking group that promotes Latinx representation in biomechanics and general science fields. Meet our group and hear about our upcoming events as well as how you can get more involved with LiB.

6:30pm – 11:00pm
Trillium Ballroom (4th Floor of the Shaw Centre)

CONFERENCE DINNER

Join us for closing dinner in the Trillium Ballroom at the Shaw Centre. Make memories with your friends and colleagues during the last evening of NACOB 2022.

A delicious three course meal will be served followed by an evening of dancing and celebrating the return to conferences!

Cost:
$100.00 per person
Pre registration is required

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POSTER LISTINGS

ABOUT THE POSTER SESSIONS

NACOB is pleased to present a wide range of current research through the poster sessions. The posters have been divided over two sessions, with each session on display for two days and having a dedicated scheduled poster reception.

Poster presenters will be present at their posters during the following reception time but are encouraged to meet outside of the reception time with interested delegates.

SESSION 1

Monday August 22 5:00pm - 7:00pm

SESSION 2

Wednesday August 24 5:00pm - 7:00pm

POSTER SESSION 1

Monday, August 22, 2022

P1-1 ***Characterizing how large and small deviations of the underlying tissue distribution of the transfemoral residual limb alter mechanical stiffness and energy loss using synthetic 3D-printed anatomical models***

Marissa Pirritano[1], Joshua Childress[2], Jason Souza[3], Nicholas Fey[1]

[1]The University of Texas at Austin, [2]The University of Texas at Dallas, [3]The Ohio State University Wexner Medical Center

P1-2 ***Effects of scaling on the geometrical accuracy of 3d-printed trabecular bone cores constructed in materialise mimics***

Erin Huitema[1], McKinley Van Klei[1], Caroline Baril[1], Heidi-Lynn Ploeg[1]

[1]Queen's University

P1-3 ***Compressive properties of 3D-printed porous bone surrogate polymer scaffolds***

José Contreras Raggio[1], Carlos Toro Arancibia[1], Alejandra Correa[1], Carolina Angulo[1], Heidi Ploeg[2], Ameet Aiyangar[3], Juan F. Vivanco[1]

[1]Universidad Adolfo Ibáñez, [2]Queen´s University, [3]Swiss Federal Laboratories for Materials Science and Technology

P1-4 ***Compressive properties of 3D-printed porous bone surrogate polymer scaffolds***

José Contreras Raggio[1], Carlos Toro Arancibia[1], Carolina Angulo-Pineda[1], Heidi-Lynn Ploeg[2], Ameet Aiyangar[3], Juan Vivanco[1], Alejandra Correa[1]

[1]Universidad Adolfo Ibáñez, [2]Queen's University, [3]Empa - Swiss Federal Laboratories for Materials Science and Technology

P1-5 ***Machine learning enhances diagnosis of osteoporotic fracture risk***

Yuvenne Deng[1], Ali Ammar[1], Cheryl Quenneville[1]

[1]McMaster University

P1-7 ***Differences in ankle proprioception and postural balance between older and younger women***

Seohyun Kim[1], Jinseok Lim[1], Chunghwi Yi[1], Onebin Lim[1]

[1]Yonsei University

P1-8 ***Age-related differences in proactive and reactive control processes in standing balance***

Sundeep Rakhra[1], Jonathan Singer[1]

[1]University of Manitoba

P1-10 ***Tracking the center of mass position during turning in older adults with and without fall histories***

Tzurei Chen[1], Li-Shan Chou[2]

[1]Pacific University, [2]Iowa State University

P1-11 ***The effect of head and eye position on balance reactions***

Brye McMorran[1], John Zettel[1]

[1]University of Guelph

P1-12 *Predictability of rambling-trembling sway may improve sensitivity of fall risk assessment*

Eryn Gerber[1], Paris Nichols[1], Camilo Giraldo[2], Carl Luchies[1]

[1]University of Kansas, [2]Olivet Nazarene University

P1-6 *How femur positioning affects dual-energy x-ray absorptiometry outcomes*

Ali Ammar[1], Cheryl Quenneville[1]

[1]McMaster University

P1-13 *Age-dependent cervical spine ligament strength model*

Minori Iizuka[1], Rachel Tanczos[1], Sean Shimada[1]

[1]Biomechanical Consultants

P1-14 *Age-related changes in multisegment foot kinematics during walking*

Nayeli Marcial Munoz[1], Usha Kuruganti[1], Victoria Chester[1]

[1]University of New Brunswick

P1-15 *The influence of age on the relationship between step width and spatial and temporal adaptation strategies during split-belt adaptation*

Patrick Monaghan[1], Sarah Brinkerhoff[1], Jaimie Roper[1]

[1]Auburn University

P1-16 *Altered Knee Kinematics with Aging using a Reference Finite Helical Axis*

Tomasz Bugajski[1], Jessica Kupper[1], Gregor Kuntze[1], Janet Ronsky[1]

[1]University of Calgary

P1-17 *The relationship between single muscle fibre and voluntary rate of force development in young and old males*

Benjamin Dalton[1], Nicole Mazara[2], Mathew Debenham[2], Derek Zwambag[1], Alex Noonan[1], Erin Weersink[1], Stephen Brown[1], Geoffrey Power[1]

[1]University of Guelph, [2]University of British Columbia

P1-18 *Sex-specific changes in shoulder joint dynamics during the transition to adulthood in manual wheelchair users with pediatric-onset spinal cord injury*

Joshua Leonardis[1], Alyssa Schnorenberg[1], Lawrence Vogel[2], Gerald Harris[3], Brooke Slavens[1]

[1]University of Wisconsin-Milwaukee, [2]Shriners Hospitals for Children-Chicago, [3]Marquette University

P1-19 *Does the Residential Care Setting Affect Body Mass Index in Older Adults?*

Mayank Kalra[1], Jaimie Killingbeck[2], Andrew Laing[1]

[1]University of Waterloo, [2]Schlegel Villages

P1-20 *Week-to-week fluctuations of pain prior to an intra-articular corticosteroid injection in adults with knee osteoarthritis*

Zaryan Masood[1], Matthew Ruder[1], Dylan Kobsar[1]

[1]McMaster University

P1-21 *An automated canine radiography quality control tool*

Peyman Tahghighi[1], Eranga Ukwatta[1], Ryan Appleby[1], Amin Komeili[2]

[1]University of Guelph, [2]University of Calgary

P1-22 *An Automatic Canine Rib Segmentation and Labelling from Radiograph*

Nargess Kalantari[1], Peyman Tahghighi[1], Eran Ukwatta[1], Amin Komeili[2]

[1]University of Guelph, [2]University of Calgary

P1-23 *Biomechanics and Simulations of Squirrels' Branch Landing Dynamics*

Zvonimir Pusnik[1], Carl Nelson[1], Nathaniel Hunt[2]

[1]University of Nebraska-Lincoln, [2]University of Nebraska-Omaha

P1-25 *Alterations in skeletal muscle morphology and mechanics in male sprague dawley rats exposed to a high-fat high-sucrose diet in childhood*

Mauricio Delgado[1], Graham MacDonnald[1], Walter Herzog[1]

[1]Human Performance Laboratory, University of Calgary, Calgary

P1-26 *The dynamics of sarcomere length non-uniformity from passive to active states in skeletal muscles*

Meng LI[1], Walter Herzog[1]

[1]University of Calgary

P1-27 *Assessing functional limb usage in a rat model of brachial plexus birth injury*

Steven Thompson[1], Kyla Bosh[1], Katherine Saul[2], Jacqueline Cole[1]

[1]North Carolina State University and University of North Carolina at Chapel Hill, [2]North Carolina State University

P1-28 *Predicting Low Back Compression From Simplified Kinematic Data Using Artificial Neural Networks*

Christopher Moore[1], Daniel Armstrong1, Raymond Tran2, Steven Fischer1

[1]University of Waterloo, 2Ryerson University

P1-29 *A fast method of predicting youth head impact brain strain*

Jeffrey Brooks[1], Haojie Mao[1], James Dickey[1]

[1]Western University

P1-30 *Dimensionality reduction techniques for classifying autistic gait patterns in children using multisegment foot kinematic data*

Ashirbad Pradhan[1], Karansinh Padhiar[1], Victoria Chester[1]

[1]University of New Brunswick

P1-31 *Concurrent validity of deep learning-based markerless motion capture for over-ground gait analysis*

Zachary Ripic[1], Joseph Signorile[1], Christopher Kuenze[2], Moataz Eltoukhy[1]

[1]University of Miami, [2]Michigan State University

P1-32 *Optimization of wearable sensor's type and location for outdoor running terrain classification*

Gabrielle Thibault[1], Vaibhav Shah[2]

[1]McGill University, [2]Montreal University

P1-33 *DeepLabCut determined wrist kinematics using a single overhead camera: a preliminary validation*

Joel Carriere[1], Calvin Young[1], Michele Oliver[1], Karen Gordon[1]

[1]University of Guelph

P1-34 *Amputee Fall Risk Classification Using Automated Foot Strike Detection from Smartphone Sensor Signals During a 6MWT*

Pascale Juneau[1], Natalie Baddour[1], Helena Burger[2], Andrej Bavec[2], Edward Lemaire[3]

[1]University of Ottawa, [2]University Rehabilitation Institute, University of Ljubljana, [3]Ottawa Hospital Research Institute

P1-35 *Predictions of knee joint contact forces using only kinematic inputs with a recurrent neural network*

Kaileigh Estler[1], Hunter Bennett[2]

[1]University of Tennessee-Knoxville, [2]Old Dominion University

P1-36 *A machine learning approach for determining whole body angular momentum from wearable sensors*

Courtney Smith[1], Jennifer Leestma[1], Aaron Young[1], Gregory Sawicki[1]

[1]Georgia Institute of Technology

P1-37 *A comparison of cycling power prediction using neural network and physics-based models*

Patrick Mayerhofer[1], Ivan Bajic;[1], Max Donelan[1]

[1]Simon Fraser University

P1-38 *Introduction to machine learning for the biomechzoo toolbox*

Vaibhav Shah[1], Philippe Dixon[1]

[1]University of Montral

P1-39 *Initial development and evaluation of a predictive geometry-based pressure map for interface surface evaluation in lower limb rehabilitation exoskeletons*

Christian Mele[1], Katja Mombaur[1], James Tung[1]

[1]University of Waterloo

P1-40 *Reliability of sonomyography for controlling prosthetic hand grasps*

Samuel Acuña[1], Susannah Engdahl[1], Erica King[1], Siddhartha Sikdar[1]

[1]George Mason University

P1-41 *Preliminary Phase Space Coordination Analyses of Transtibial Amputees Walking with Powered and Passive Devices*

Austin Mituniewicz[1], He (Helen) Huang[1]

[1]University of North Carolina-Chapel Hill & North Carolina State University

P1-42 *Predicting user comfort of an ankle exoskeleton using a modified visual analogue scale*

Mohammed Mohammed El Husaini[1], Axl Maberry[1], Anne Martin[1]

[1]Pennsylvania State University

P1-43 *The Effect of Assistance Magnitude on the Metabolic Cost of Walking With an Energy-Removing Exoskeleton*

Michael Shepertycky[1], Qingguo Li[1]
N [1]*Queen's University*

P1-44 *Spatiotemporal and muscle activation adaptations during overground walking in response to lower body added mass*

Vinayak Vijayan[1], Allison Kinney[1]
[1]*University of Dayton*

P1-45 *Effect of exoskeleton design and user experience on metabolic cost during walking: A systematic review*

Gillian Phillips[1], Megan McAllister[1], Jessica Selinger[1]
[1]*Queen's University*

P1-46 *The long term effects of ankle-knee-hip robot-assisted gait training on gait speed, balance, muscle activity, hip and knee torque, quality of life, and depression in multiple sclerosis a pilot study*

Heejun Kim[1], Haeun Park[1], Chanhee Park[1], Joshua (Sung) H. You[1]
[1]*Yonsei University*

P1-47 *Experimental Implementation of Hybrid Volitional Control on a Transtibial Prosthesis*

Ryan Posh[1], James Schmiedeler[1], Patrick Wensing[1]
[1]*University of Notre Dame*

P1-48 *Analysis of motor-knee joint misalignment during walk and jog with a lower-limb exoskeleton*

Benjamin Tremblay[1], Scott Brandon[2], Chris McGibbon[1]
[1]*University of New Brunswick,* [2]*University of Guelph*

P1-49 *Joint-level biomechanics of high-intensity industrial tasks to inform exoskeleton mitigation strategies*

Felicia Davenport[1], Jennifer Leestma[1], Adriana Staten[1], Krishan Bhakta[1], Joshua Fernandez[1], Anirban Mazumdar[1], Aaron Young[1], Gregory Sawicki[1]
[1]*Georgia Institute of Technology*

P1-50 *Examining Individual Differences in Initial Response to Physical Augmentation*

Jasim Naeem[1]
[1]*DCS Corporation/U.S. Army DEVCOM Army Research Laboratory*

P1-51 *Assist-as-needed therapy for stroke rehabilitation using maestro hand exoskeleton*

Job Ramirez[1], Paria Esmatloo[1], Saad Yousaf[1], Kristen Coupland[1], Ashish Deshpande[1], Na Jin Seo[1]
[1]*The University of Texas at Austin*

P1-52 *Design and Validation of a Clutch Mechanism with Integrated Force and Displacement Sensing for Quasi-Passive Exosuits*

Paul Slaughter[1], Shane King[1], Cameron Nurse[1], Chad Ice[1], Michael Goldfarb[1], Karl Zelik[1]
[1]*Vanderbilt University*

P1-53 *Examining the role of plantar-surface cutaneous sensation on shear force and CoP during balance responses to slip perturbations*

Keara Sutherland[1], Rachel Billo[1], Jessica Berrigan[1], Stephen Perry[1]
[1]*Wilfrid Laurier University*

P1-54 *Design and evaluation of a cost-effective and simplistic 2D centre of mass device*

Adam Thompson[1], Madeline Bond[1], Tim Bryant[1], Qingguo Li[1], Linda Bossi[2]
[1]*Queen's University,* [2]*Defense Research and Development Canada*

P1-55 *Arm movements reduce center of mass excursion during a slip perturbation*

Jonathan Lee-Confer[1], Kornelia Kulig[1], Matthew Lo[2], Christopher Powers[1]
[1]*University of Southern California,* [2]*University of California, Irvine*

P1-56 *Effects of a Simulated Fatiguing Manual Material Handling Task on Fall Risk Due to Slipping and Tripping*

Leigh Allin[1], Michael Madigan[2]
[1]*Exponent,* [2]*Virginia Tech*

P1-57 *Does the Shoe Sole Increase Fall Risk after a Standing Slip?*

Jiyun Ahn[1], Caroline Simpkins[1], Sangwon Shin[1], Feng Yang[1]
[1]*Georgia State University*

P1-58 *Does stepping limb influence characteristics of gait initiation?*

Grace Kellaher[1], James Tracy[1], Jocelyn Hafer[1], Jessica Allen[2], J. Hendrik Reimann[1], Thomas Buckley[1], Jeremy Crenshaw[1]

[1]University of Delaware, [2]West Virginia University

P1-59 *Control of the lead and trail limb during obstacle crossing differs when contending with visual cues and cognitive loading*

Jenna Pitman[1], Amanda Burton[1], Lori Ann Vallis[1]

[1]University of Guelph

P1-60 *Margin of stability during a 90-degree turn while walking in individuals with mild Parkinson's disease*

Gordon Alderink[1], Marie Bourke[1], Akeya Gosla[1], Sarah Rustmann[1], Lauren Hickox[2], David Zeitler[1], Cathy Harro[1]

[1]Grand Valley State University, [2]Penn State University

P1-61 *Comparing gaze behaviours of young adults during circumvention involving different pedestrian movements*

Sheryl Bourgaize[1], Félix Fiset[2], Michael Cinelli[1], Anouk Lamontange[3], Bradford McFadyen[2]

[1]Wilfrid Laurier University, [2]Université Laval, [3]McGill University

P1-62 *Human Navigation of Complex Curvilinear Paths*

Anna Render[1], Jonathan Dingwell[1]

[1]Penn State Univerisity

P1-63 *Effects of postural task and divided attention on peripheral vision*

Brontë Vollebregt[1], Jacob Banks[2], Bahar Sharafi[3], Jesse Jacobs[4], Veronica Miyasike-daSilva[1]

[1]University of Manitoba, [2]Beth Israel Deaconess Medical Center, [3]Nike, [4]University of Vermont

P1-64 *Effects of unilateral arm constraint on trip recovery: preliminary results*

Bradley Moore[1], Rebecca Stine[2], Paul Hammond II[2], Matthew Major[1]

[1]Northwestern University and Jesse Brown Veterans Affairs Medical Center, [2]Jesse Brown Veterans Affairs Medical Center

P1-65 *The utility of stability: whole body angular momentum informs step placement during perturbed walking*

Jennifer Leestma[1], Courtney Smith[1], Pawel Golyski[1], Aaron Young[1], Gregory Sawicki[1]

[1]Georgia Institute of Technology

P1-66 *Self-reported limb dominance does not explain asymmetric control of standing sway*

James Tracy[1], Jessica Allen[2], Thomas Buckley[1], Jocelyn Hafer[1], Jan Reimann[1], Jeremy Crenshaw[1]

[1]University of Delaware, [2]West Virginia University

P1-67 *The effects of multiple pregnancies on gait asymmetry: a case study*

Aude Lefranc[1], Glenn Klute[2], Richard Neptune[1]

[1]Walker Department of Mechanical Engineering, The University of Texas at Austin, [2]VA Center for Limb Loss and MoBility and Department of Mechanical Engineering, University of Washing

P1-68 *Improvements in bilateral balance after unilateral total ankle arthroplasty*

Noor Tasnim[1], Robyn Hansen[1], Sam Weiss[2], Sara Arena[1], Robin Queen[1]

[1]Virginia Tech, [2]University of Missouri

P1-69 *Bilateral and Asymmetric Loading on lower extremities muscle activities and body sway during step-up exercise*

Michael Krackow[1], Joyce Blandino[1]

[1]Virginia Military Institute

P1-70 *Walking while performing a visual search task impacts immediate slip response in people with Parkinson's Disease*

Mary-Elise MacDonald[1], Tarique Siragy[1], Julie Nantel[1]

[1]University of Ottawa

P1-71 *The role of arm movements for maintaining balance when walking on a narrow beam*

Reza Sharif Razavian[1], Meghan Huber[2], Enrico Chiovetto[3], Martin Giese[3], Dagmar Sternad[1]

[1]Northeastern University, [2]University of Massachusetts Amherst, [3]University Clinic of Tübingen

P1-72 *Effect Of Neuromuscular Electrical Stimulation On One-Leg Standing Balance and Proprioception*

Woochol Joseph Choi[1]

[1]*Yonsei University, Injury Prevention and Biomechanics Laboratory*

P1-73 *Muscle Coordination Complexity Across Different Locomotor Tasks in Young Adults*

Grant Maddox[1], Hannah Carey[1], Andrew Shelton[2], Vicki Mercer[3], Jeremy Crenshaw[4], Jason Franz[2], Jessica Allen[1]

[1]*West Virginia University,* [2]*University of North Carolina Chapel Hill, North Carolina State University,* [3]*University of North Carolina Chapel Hill,* [4]*University of Delaware*

P1-74 *Determining Perturbation Onset For A Force-Plate Instrumented Push-And-Release Test*

Michael Christensen[1], James Tracy[1], Jeremy Crenshaw[1]

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Caroline Simpkins[1], Jiyun Ahn[1], Sangwon Shin[1], Feng Yang[1]

[1]*Georgia State University*

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Juanita Wallace

Transylvania University

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Kimberly Bigelow[1], Allison Kinney[1]

[1]*University of Dayton*

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Mukul Talaty[1], Brooke Odle[2], Jacob Hinkel-Lipsker[3], David Phillips[4], Allison Altman-Singles[1], Craig Goehler[5], Kim Bigelow[6]

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Lindsay Clarke[1], Resa Jones[1], Shivayogi Hiremath[1], Corinna Franklin[2], Carole Tucker[3]

[1]*Temple University,* [2]*Lewis Katz School of Medicine,* [3]*University of Texas Medical Branch*

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Seyoung Lee[1], Kitaek Lim[1], Woochol Choi[1]

[1]*Yonsei University*

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Denise Balogh[1], Michelle Campbell[1], Aaron Kociolek[1]

[1]*Nipissing University*

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Terri Weeks[1], Kimberly Peckett[1], Daniel Mines[1], Stacey Acker[1]

[1]*University of Waterloo*

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Katie Goggins[1], Taryn Thompson[1], Elizabeth Kelly[1], Tammy Eger[1]

[1]*Laurentian University*

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Rebecca Wendland[1], Linda Bossi[2], Ed Nakaza[3], Eliza Cazzola[1], Michele Oliver[1]

[1]*University of Guelph,* [2]*Defence Research and Development Canada,* [3]*HumanSystems Incorporated*

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Vanessa Ramirez[1], Farshid Ghezelbash[2], Aboulfazl Shirazi-Adl[2], Babak Bazrgari[3]

[1]*US Army Research Institute of Environmental Medicine,* [2]*Polytechnique Montreal,* [3]*University of Kentucky*

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Sarah Griffin[1], David Williams[1], Kurt Beschorner[1]

[1]*University of Pittsburgh*

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Kayla Walker[1], Conor Tosh[1], Jon Doan[1]

[1]University of Lethbridge

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Sharanya Ganesh[1], Galen Holland[2], Klaire Dickey[1], Rakie Cham[2]

[1]University of Pittsburgh, [2]Graduate (PhD) Student Researcher

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Alvin Fortaleza[1], Daniel Cousins[1], Giulia Albanese[2], Jacopo Zenzeri[2], Michael Holmes[1]

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Jacqueline Toner[1], Usha Kuruganti[1], Jim Ketterling[2], Victoria Chester[1]

[1]University of New Brunswick, [2]J.D. Irving

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Kristen Lantis[1], Deanna Schmidt[1]

[1]California State University San Marcos

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Cameron Weeks[1], Cal Bradshaw[1], Tyler Standifird[2], Aubree McLeod[1], Iain Hunter[1]

[1]Brigham Young University, [2]Utah Valley University

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Adrienne Henderson[1], Dustin Bruening[2], Thomas Hulcher[3], Elisa Arch[1]

[1]University of Delaware, [2]Brigham Young University, [3]Thomas Jefferson University

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Aidan Gross[1], Kali Shamaly[1], Erica Casto[1], Katherine Boyer[1]

[1]University of Massachusetts Amherst

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[1]Carleton University

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Donna Fok[1], Jack Callaghan[1]

[1]University of Waterloo

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Stephanie Lowther[1], Jessica Butterfield[1], Andrew Post[1], Clara Karton[1], Michael Robidoux[1], Michael Gilchrist[2], Thomas Blaine Hoshizaki[1]

[1]University of Ottawa, [2]University College Dublin

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Benjamin Krbavac[1], Julia Meliambro[1], Clara Karton[1], Janie Cournoyer[1], Andrew Post[1], Thomas Hoshizaki[1], Michael Gilchrist[2]

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Amy Murphy[1], Andrew Post[1], Michael Gilchrist[2], Thomas Blaine Hoshizaki[1]

[1]University of Ottawa, [2]University of Dublin

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Klara Doelle[1], Jasmine Ferdousi[1], Clara Karton[1], Andrew Post[1], Michael Gilchrist[2], Blaine Hoshizaki[1]

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Scott Crawford[1], Jack Martin[1], Kenneth Lee[1], Bryan Heiderscheit[1]

[1]University of Wisconsin-Madison

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Armaan Sekhon[1], Walter Herzog[1]

[1]University of Calgary

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John Ramsdell[1], Bruce Beynnon[1], Marit Scott[1], Niccolo Fiorentino[1]

[1]University of Vermont

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Joseph Crisco, Amy Morton, Douglas Moore, Josephine Kalshoven

Brown University

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Jason Cox[1], Katherine Saul[2], Jacqueline Cole[1]

[1]UNC Chapel Hill / NC State University, [2]NC State University

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Lauren Welte[1], Lauren Welte[1], Darryl Thelen[1]

[1]University of Wisconsin - Madison

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Stacey Zeigler[1], Benjamin Ellis[1], Eola Saucier[1], Kimberly Collins[1], Laurel Kuxhaus[1]

[1]Clarkson University

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Sean Murray[1], Steven Pretty[1], Andrew Laing[1]

[1]University of Waterloo

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Seungsu Kim[1], Kitaek Lim[1], Junwoo Park[1], Jongwon Choi[1], Stephen Robinovitch[2], Chunghwi Yi[1], Woochol Choi[1]

[1]Yonsei University, [2]Simon Fraser University

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Alexandra Mahna[1], Kendal Marriott[2], Jaclyn Chopp-Hurley[1]

[1]York University, [2]University of Waterloo

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Hannah Carey[1], Grant Maddox[1], Andrew Shelton[2], Vicki Mercer[2], Jeremy Crenshaw[3], Jason Franz[2], Jessica Allen[1]

[1]West Virginia University, [2]UNC Chapel Hill, [3]University of Delaware

P1-113 *A mechatronic system that provides controlled vertical forces to people while they walk*

Pavreet Gill[1], Andrew Ries[2], Katherine Steele[3], Michael Schwartz[4], J. Maxwell Donelan[1]

[1]Simon Fraser University, [2]Gillette Children's Specialty Healthcare, [3]University of Washington, [4]University of Minnesota

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Yujin Kwon[1], Woojin Yoon[1], Jieon Lee[1], Gwanseob Shin[1]

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Haneol Kim[1], Diego Ferreira[2], Jianhua Wu[1]

[1]Georgia State University, [2]Lebanon Valley College

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Matthew Beth[1], Sarah Brinkerhoff[1], William Murrah[1], Jaimie Roper[1]

[1]*Auburn University*

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Pei-Chun Kao[1], Colin Lomasney[1], Amie Russell[1]

[1]*University of Massachusetts Lowell*

P1-118 *A method to detect changes in joint angles before and after a speed change*

Greggory Murray[1], Anne Martin[1]

[1]*Pennsylvania State University*

P1-119 *Is leg muscle strength correlated with metabolic power in people with unilateral transtibial amputation?*

Zane Colvin[1], Joshua Tacca[1], Alena Grabowski[1]

[1]*University of Colorado Boulder*

P1-120 *Using muscle synergy analysis to investigate exoskeleton adaptation*

Courtney Haynes[1], J. Cortney Bradford[1], Seongmi Song[2]

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Kalindra Walls[1], Esthevan Machado[1], Donald Golden[1], Jason Oliemans[1], Eric Bennett[1], Spencer Skaper[1], Jared Fletcher[1]

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Taylor Higgins[1], Gabriel Bravo-Palacios[1], James Schmiedeler[1], Patrick Wensing[1]

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Joshua Weinhandl[1], Sierra Hastings[2], Joshua Lardie[1], Eric Dugan[3]

[1]*University of Tennessee,* [2]*Texas Children's Hospital,* [3]*Baylor College of Medicine*

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Robert Wiederien[1], Wesley Gari[1], Jason Wilken[1]

[1]*University of Iowa*

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Nicole Rendos[1], Zahin Alam[1], Alex Vargas[1], Joseph Makanjuola[1], Trisha Kesar[1]

[1]*Emory University School of Medicine*

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Jereme Outerleys[1], Vajra Keller[1], Robert Kanko[1], Elise Laende[1], Kevin Deluzio[1]

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P1-127 *Gait adaptations of individuals with cerebral palsy on irregular surfaces: A scoping review*

Sahar Mohammadyari gharehbolagh[1], Denis Arvisais[1], Maxime Robert[1], Philippe Dixon[1]

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P1-128 *How humans adapt stepping to perform lateral maneuvers*

David Desmet[1], Joseph Cusumano[1], Jonathan Dingwell[1]

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Ashlyn Jendro[1], Jessica Passarelli[1], Tiphanie Raffegeau[2], Abigail Schmitt[1]

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Joseph Mahoney[1], Benjamin Infantolino[1], Allison Altman-Singles[1]

[1]*Penn State Berks*

P1-131 *Changes in Peak Ankle Dorsiflexion During Running After Foot and Ankle Injuries*

Logan Gaudette[1], Andrew Wilzman[1], Karen Troy[1]

[1]*Worcester Polytechnic Institute*

P1-132 *Muscle contributions to pre-swing biomechanical tasks in stroke survivors with and without stiff knee gait*

Lydia Brough[1], Steven Kautz[2], Richard Neptune[1]

[1]University of Texas at Austin, [2]Medical University of South Carolina

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Charlotte Caskey[1], Siddhi Shrivastav[1], Kristie Bjornson[2], Desiree Roge[2], Chet Moritz[1], Katherine Steele[1]

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Rebecca Krupenevich[1], Gregory Sawicki[1], Jason Franz[1]

[1]University of North Carolina

P1-135 *Human lower limb myoelectric dynamics during underwater treadmill walking*

Seongmi Song[1], Andrew Nordin[1]

[1]Texas A&M University

P1-136 *Musculoskeletal models for human stepping after spinal cord injury*

Musa Audu[1], Gabrille Labrozzi[1], Holly Warner[1], Nathaniel Makowski[2], Ronald Triolo[3]

[1]Case Western Reserve University, [2]MetroHealth Medical Center, [3]Louis Stokes Cleveland VA Medical Center

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Joshua Lardie[1], Joshua Weinhandl[1]

[1]University of Tennessee, Knoxville

P1-138 *The modular control of skipping*

Abigail Salvadore[1], John Willson[2], Paul DeVita[2], Richard Neptune[3], Sarah Roelker[1]

[1]University of Massachusetts, [2]East Carolina University, [3]University of Texas at Austin

P1-139 *Muscle synergy merging hypothesis post-stroke: A second look*

Mohammad S. Shourijeh[1], Di Ao[1], Benjamin Fregly[1]

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P1-140 *Effects of gradually and abruptly introduced split-belt walking on savings*

Brian Selgrade[1], Daniel Gregory[2], Montgomery Bertschy[3], Maia Schlechter[3], Wouter Hoogkamer[3]

[1]Westfield State University, [2]Shriners Children's New England, University of Massachusetts Amherst, [3]University of Massachusetts Amherst

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Sarah Kettlety[1], Morgan Kelly[1], Maryana Bonilla Yanez[1], Kristan Leech[1]

[1]University of Southern California

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Sara Arena[1], Sara Arena[1]

[1]Virginia Tech

P1-143 *Longitudinal stability of gait behavior within and between mood phases in individuals with bipolar disorder*

Melissa Gross[1], Gu Kang[2], Xinyu Li[1]

[1]University of Michigan, [2]University of Texas at Dallas

P1-144 *Stride-by-Stride Variability Impacts on Running Economy*

Iain Hunter[1], Jared Steele[1], Kaleigh Renninger[1], Cameron Weeks[1]

[1]Brigham Young University

P1-145 *Curious consequences of cadence cues on treadmill and overground running*

Alison Sheets-Singer[1], Landi Wilson[1], Rachel Wathen[1], Bryan Conrad[1]

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Mohammad Mohammad[1]

[1]Queen's University

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Kirsten Anderson[1], Jason Wilken[1]

[1]The University of Iowa

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Margaret Harrington[1], Ikeade Adeyinka[1], Timothy Burkhart[1]

[1]*University of Toronto*

P1-149 *A simulation study investigating alternative approaches to the point cluster technique*

Vivek Karmarkar[1], Rachel Vitali[1]

[1]*University of Iowa*

P1-150 *How surgeon's choice of osteotomy location affects muscle-induced joint forces when correcting femoral deformities in dysplastic hips*

Molly Shepherd[1], John Clohisy[1], Jeffrey Nepple[1], Michael Harris[1]

[1]*Washington University in St. Louis*

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Marianne Gagnon[1], Louis-Nicolas Veilleux[1], Mitchell Bernstein[1]

[1]*Shriners Hospitals for Children-Canada/McGill University*

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Emily Sinitski[1], Natalie Baddour[2], Hossein Gholizadeh[2], Markus Besemann[3], Nancy Dudek[2], Edward Lemaire[2]

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Kiara Barrett[1], Zachary Sievert[1], Hunter Bennett[1]

[1]*Old Dominion University*

P1-154 *The effect of countermovement jump height on coordination variability*

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[1]*Queen's University*

P1-155 *Coordination variability and injury risk in experienced collegiate dancers*

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[1]*University of Michigan,* [2]*Northern Michigan University,* [3]*University of Oklahoma*

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Natanael Batista[1], Micah Garcia[1], David Bazett-Jones[1]

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Pias Das[1], Sunghwan Joo[1], Yunju Lee[1]

[1]*Grand Valley State University*

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Shelby Thompson[1], Sydni Whitten[1], Katelyn Campbell[1], Tarkeshwar Singh[2], Harshvardhan Singh[3], Li Li[4], Joshua Vova[5], Christopher Modlesky[1]

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Hafizur Rahman[1], Cody Anderson[1], Iraklis Pipinos[2], Jason Johanning[2], Jianghu Dong[2], Sara Myers[1]

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David Ortiz-Weissberg[1], Kornelia Kulig[1]

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P1-161 *Viscoelastic models for predicting force response of prosthetic foot components*

Jordan Bradshaw[1], Tim Bryant[1]

[1]*Queen's University*

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Behzad Danaei[1], John McPhee[1]

[1]*University of Waterloo*

P1-163 *Lower-limb motor adaptation during a haptic robot reaching task*

Alexander Dawson-Elli[1], Stephanie Hernández Hernández[1], Peter Adamczyk[1]

[1]*University of Wisconsin - Madison*

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Nayun Ahn[1], Hoon Kim[2], Kristof Kipp[1]

[1]Marquette University, [2]Joint Department of Biomedical Engineering, University of North Carolina at Chapel Hill and North Ca

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Perri Johnson[1], Denis DiAngelo[1], Max Paquette[2]

[1]University of Tennessee Health Science Center, [2]University of Memphis

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Marc-Olivier St-Pierre[1], Mohammad Reza Effatparvar[1], Mickaël Begon[2], Stéphane Sobczak[1]

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Michael Del Bel[1], Nicholas Romanchuk[1], Sasha Carsen[2], Daniel Benoit[1]

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P1-169 *Validation of the star balance mat compared to the traditional star excursion balance test*

Tiffany Tiu[1], Timothy Burkhart[1]

[1]University of Toronto

P1-170 *Monitoring lower-limb biomechanics, asymmetry, and introspective state in healthy athletic populations: A scoping review*

Joshua Keogh[1], Emma Waddington[1], Zaryan Masood[1], Matthew Ruder[1], Sobia Mahmood[1], Chris Bishop[2], Matthew Jordan[3], Jennifer Heisz[1], Dylan Kobsar[1]

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P1-171 *Do leg asymmetries interact with time of day in physiotherapy clinical tests?*

Inaê Marcelo[1]

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P1-172 *Knee moments and tibia kinematics measured using an IMU during a simulated one-legged jump landing*

Amanda Esquivel[1], Mirel Ajdaroski[1], So Young Baek[2], Melanie Beaulieu[2], James Ashton-Miller[2]

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Rachel Robinson[1], Seth Donahue[1], Aida Chebbi[1], Yuta Suzuki[2], Michael Hahn[1]

[1]University of Oregon, [2]Osaka City University

P1-174 *The compressive and shear elastic properties of diabetic and non-diabetic plantar skin*

Lynda Brady[1], Shruti Pai[1], Joseph Iaquinto[1], Yak-Nam Wang[1]

[1]VA Puget Sound

P1-175 *Comparison of Numerical Methods for Modeling Trabecular Bone Indentation*

Remy Benais[1], Aleksander Rycman[1], Stewart McLachlin[1]

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P1-176 *Effects of ultrasound settings on temperature changes in nitinol implants*

Shaye Tiell[1], Manaswini Chennoju[1], Brian Davis[1], Josiah Owusu-Danquah[1]

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Kevin Nguyen[1], Ahmed Habis[1], Emad Anam[1], Lacey Wice[1], Julie Chan[1], Ryan Bicknell[1], Parham Daneshvar[1], Heidi-Lynn Ploeg[1]

[1]Queen's University

P1-178 *Kinematic reliability with markerless motion capture*

Ava Taylor[1], Richard Edwards[1], Audrey Westbrook[1], Kevin Ford[1]

[1]High Point University

P1-179 *Autism spectrum disorder: Should we be more flexible in our running assessments?*

Lauren Luginsland[1], Hunter Bennett[1]

[1]Old Dominion University

P1-180 *Ankle-foot orthosis alters joint torques and powers in patients with peripheral artery disease*

Farahnaz Fallahtafti[1], Iraklis Pipinos[2], Jason Johanning[2], Hafizur Rahman[1], Mahdi Hassan[1], Sara Myers[1]

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Hisham Mohammad[1]

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P1-182 *Modelling fibular kinematics using skin marker motion capture*

Chloe Baratta[1], Karley Baringer[1], Christopher Reb[2], Jennifer Nichols[1]

[1]University of Florida, [2]Pennsylvania State University

P1-183 *Effects of step height on shoulder and pelvis rotations in the transverse plane during stepping in place*

Nicole Paquet[1]

[1]University of Ottawa

P1-184 *How varsity athletes do pushups may tell us how fast they swim*

Gael Chaubet[1], David Frost[1]

[1]University of Toronto

P1-185 *Relationship between feedback motor control and cortical sensorimotor integration in stroke survivors*

Christian Schranz[1], James McCall[2], Derek Kamper[2], Na Jin Seo[1]

[1]MUSC, [2]NCSU

P1-186 *The inter-segmental coordination and knee motion during gait in total knee arthroplasty*

Alexandre R Pelegrinelli[1], Erik Kowalski[2], Felipe Moura[1], Mario Lamontagne[2]

[1]State University of Londrina, [2]University of Ottawa

P1-187 *Reduced Range of Motion and Higher Movement-Evoked Pain in Individuals with Carpometacarpal Osteoarthritis*

Tamara Ordonez Diaz[1], Samuel Licht[1], Yenisel Cruz-Almeida[1], Jennifer Nichols[1]

[1]University of Florida

P1-188 *Relationships between stride length and ground reaction forces in adolescent long-distance runners*

Micah Garcia[1], Bryan Heiderscheit[2], Emily Kraus[3], Amanda Murray[1], Grant Norte[1], David Bazett-Jones[1]

[1]The University of Toledo, [2]University of Wisconsin-Madison, [3]Stanford Children's Orthopaedic and Sports Medicine Center

P1-189 *Real-world evidence of upper extremity asymmetry*

Sandesh Bhat[1], Alexander Shin[1], Kenton Kaufman[1]

[1]Mayo Clinic

P1-190 *Effect of a force perturbation protocol on bilateral upper limb coordination in persons with stroke*

Haifa Akremi[1], Johanne Higgins[1], Rachid Aissaoui[2], Sylvie Nadeau[1]

[1]University of Montreal, [2]University of Quebec

P1-191 *Lower Limb Joint Kinematics Using Waterproof IMU and Motion Capture: A Case Study*

Joseph Harrington[1], Nickolas Nahm[2], David Kingston[1]

[1]University of Nebraska Omaha, [2]University of Nebraska Medical Center

P1-192 *Power generation in the knee and ankle joints during the baseball pitch*

Moira Pryhoda[1], Jacob Howenstein[2], Kristof Kipp[3], Michelle Sabick[1]

[1]University of Denver, [2]Blast Motion, [3]Marquette University

P1-193 *Assessing Inter- and Intra-Rater Reliability of Movement Scores and The Effects of Body-Shape Using A Custom Visualisation Tool*

Gwyneth Ross[1], Xiong Zhao[1], Nikolaus Troje[2], Steven Fischer[3], Ryan Graham[1]

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P1-194 *Optimizing procedures for calculating jump height from force plate data*

Brendan Pinto[1], Jack Callaghan[1]

[1]University of Waterloo

P1-195 ***Implementation and Evaluation of a Baseball Pitching Program and Its Impact on Pitching Biomechanics***

Tyler Hamer[1], Adam Rosen[1], Samuel Wilkins[1], Brian Knarr[1]

[1]University of Nebraska Omaha

P1-196 ***Biomechanical assessments of the spine during a 2000m ergometer row test***

Jordan Ankersen[1], Bradley Lambert[2], Stephanie Gardner[2], Brendan Holderread[2], Michael Moreno[1], Shari Liberman[2]

[1]Texas A&M University, [2]Houston Methodist

P1-197 ***Kinematic and kinetic comparison between pre-professional Dominican Republic and American baseball pitchers***

Kristen Nicholson[1], Joseph Mylott[1], Tessa Hulburt[1], Tyler Hamer[2], Garrett Bullock[1]

[1]Wake Forest School of Medicine, [2]University of Nebraska at Omaha

P1-198 ***Validity and reliability of baseball swing sensors***

Arnel Aguinaldo[1]

[1]Point Loma Nazarene University

P1-199 ***Sensitivity analysis of different low-pass filter cut-off frequencies on lumbar spine kinematic data and its impact on the agreement between accelerometers and a motion capture system***

Mona Frey[1], Jonathan Williams[2], Alexander Breen[2], Diana De Carvalho[1]

[1]Memorial University of Newfoundland, [2]Bournemouth University

P1-200 ***Handle Dynamics in Rowing Using a Wearable Ultra-Wideband Positioning System***

Luis Rodriguez Mendoza[1], Kyle O'Keefe[1]

[1]University of Calgary

P1-201 ***Exploring the interaction between the idle sleep mode and inertial measurement unit settings on data acquisition of the GT9X Actigraph accelerometer***

Hannah Coyle-Asbil[1], Janik Habegger[1], Michele Oliver[1], Lori Ann Vallis[1]

[1]University of Guelph

P1-202 ***Dynamic time warping approach to identifying static periods in foot-mounted inertial measurement units***

Samuel Murphy[1]

[1]University of Iowa

P1-203 ***Understanding and mitigating magnetic distortion during biomechanical inertial sensing***

Kristen Beange[1], Adrian Chan[1], Ryan Graham[2]

[1]Carleton University, [2]University of Ottawa

P1-205 ***Head and neck muscles moment prediction under various transversal loading application to the head***

Wissal Mesfar[1], Luciel Pelland[2], Kodjo Moglo[3]

[1]King Saud University, [2]Queen's University, [3]Royal Military College of Canada

P1-206 ***The effect of contraction intensity on the relationship between surface and indwelling electromyography***

Daniel Desroches[1], Daniel Desroches[1], Matthew Russell[1], Sam Vasilounis[1], Talia Alenabi[2], Jaclyn Chopp-Hurley[1], Janessa Drake[1]

[1]York University, [2]University of Waterloo

P1-207 ***Sex specific muscle weakness leads to spinal deformity in female mice***

Alex Noonan[1], Stephen Brown[1]

[1]University Of Guelph

P1-208 ***Functional force/load-velocity profiles of sled pushes***

Franziska Onasch[1], Andrew Sawatsky[1], Walter Herzog[1]

[1]University of Calgary

P1-209 ***3d lumbar spine modeling using muscle-skeletal ultrasound imaging: a preliminary study of validation***

Mohammad Effatparvar[1], Marc-Olivier St-Pierre[1], stephane sobczak[1]

[1]Université du Québec à Trois-Rivières

P1-210 ***Consolidation of Mechanical and Neurological Models: Converting One-Dimensional Tissue Stresses into Nociceptive Neural Activity***

Daniel Viggiani[1], Jack Callaghan[1]

[1]University of Waterloo

P1-211 *Rigidity analysis predicts vertebral fracture outcomes in metastatic and augmented vertebral bodies*

Asghar Rezaei[1], Maryam Tilton[1], Maria Astudillo Potes[1], Kenton Kaufman[1], Lichun Lu[1]

[1]*Mayo Clinic*

P1-212 *Using custom dynamic orthoses to prevent post-traumatic ankle osteoarthritis*

Kirsten Anderson[1], Lucinda Williamson[1], Molly Corlett[1], Donald Anderson[1], Jason Wilken[1]

[1]*University of Iowa*

P1-213 *Non-linear elastic testing and finite element modelling of rigid polyurethane foam*

Tarek Issa[1], Baixuan Yang[1], Ainara Irastorza-Landa[2], Heidi-Lynn Ploeg[1]

[1]*Queen's University*, [2]*Nobel Biocare Services AG*

P1-214 *The effect of high and low impact loading on the ACL and MCL in adolescent patients*

Alexandria Mallinos[1], Kerwyn Jones[2], Brian Davis[1]

[1]*Cleveland State University*, [2]*Akron Children's Hospital*

P1-215 *The Impact of Finger Length and Posture on Muscle Activation Patterns Using Computer Modeling*

Miranda Ludovice[1], Katherine Saul[1], Derek Kamper[1]

[1]*NC State University*

P1-216 *Kinetics of high intensity interval training during handcycling*

Kellie Halloran[1], Joseph Peters[1], Michael Focht[1], Ian Rice[1], Mariana Kersh[1]

[1]*University of Illinois Urbana-Champaign*

P1-217 *Studying the effect of suture complexity on intracranial pressure load distribution*

Tsolmonbaatar Khurelbaatar[1], Michael Doschak[1], Lindsey Westover[1], Dan Romanyk[1]

[1]*University of Alberta*

P1-218 *Validating hand-mass interaction models for simulating lifting tasks in opensim*

Mohammadhossein Akhavanfar[1], Alexandre Mir-Orefice[1], Thomas Uchida[1], Ryan Graham[1]

[1]*University of Ottawa*

P1-219 *Does mass influence predicted muscle activations in upper limb isometric tasks?*

Maximillian Diaz[1], Joel Harley[1], Jennifer Nichols[1]

[1]*Univeristy of Florida*

P1-220 *Proprioceptive Acuity in Lifting Differs Between Static and Dynamic Measurement Techniques*

Daniel Armstrong[1], Steven Fischer[1]

[1]*University of Waterloo*

P1-221 *Effect of neuroanatomy on motor evoked potentials after intermittent theta burst stimulation*

Neil Mittal[1], Cooper Hodges[1], Bhushan Thakkar[1], Ravi Hadimani[1], Carrie Peterson[1]

[1]*Virginia Commonwealth University*

P1-222 *Is the flexion relaxation ratio a reliable, responsive, and valid outcome measure for individuals with and without non-specific spine pain? A systematic review*

Diana De Carvalho[1], Sarah Mackey[1], Daphne To[1], Allyson Summers[1], Mona Frey[1], Kristen Romme[1], Sheilah Hogg-Johnson[2], Samuel Howarth[2]

[1]*Memorial University of Newfoundland*, [2]*Canadian Memorial Chiropractic College*

P1-223 *The impact of participant instructions on lumbopelvic rhythm outcome variables during a spine flexion and return task*

Andrew Wilkie[1], Mona Frey[1], Diana DeCarvalho[1]

[1]*Memorial University*

P1-224 *Use of virtual reality for assessing neural outcomes in healthy adults*

Sheridan Parker[1], Brandon Lacy[1], Brian Ricks[1], Jorge Zuniga[1], Brian Knarr[1]

[1]*University of Nebraska at Omaha*

P1-225 *Force sharing task with hands: an optimality framework from experiments*

Nadja Marin[1], Sriram Sekaripuram Muralidhar[2], Zhengcan wang[2], Manoj Srinivasan[2]

[1]*University of Illinois Urbana-Champaign*, [2]*The Ohio State University*

P1-226 *The effect of neuromuscular fatigue on the spatiotemporal coordination of rowing*

Carl Alano[1], Chris Vellucci[1], Aurora Battis[1], Shawn Beaudette[1]

[1]*Brock University*

P1-227 *Irregular Metronomes Alter Bimanual Coordination Dynamics*

Kolby Brink[1], Nick Stergiou[1], Joel Sommerfeld[1], Aaron Likens[1]

[1]*University of Nebraska-Omaha*

P1-228 *Finite element mesh sensitivity analysis for trabecular bone modelling*

Kail Beloglowka[1], Juan Vivanco[2], Sylvana García-Rodríguez[3], A. Keith Pilkey[1], W. Brent Lievers[4], Heidi-Lynn Ploeg[1]

[1]*Queen's University at Kingston,* [2]*Universidad Adolfo Ibáñez,* [3]*University of Wisconsin School of Medicine and Public Health,* [4]*Laurentian University*

P1-229 *Cutting biomechanics post-ACLR: A matched control and between-limb comparison*

JJ Hannigan[1], Montana Kaiyala[1], Andrew Traut[1], Christine Pollard[1]

[1]*Oregon State University - Cascades*

P1-230 *Tracking day-to-day Achilles tendon loading progression during rupture recovery*

Ke Song[1], Stephanie Cone[2], Jennifer Zellers[3], Darryl Thelen[2], Josh Baxter[1]

[1]*University of Pennsylvania,* [2]*University of Wisconsin,* [3]*Washington University*

P1-232 *Test-retest reliability of clinically adapted tests to assess lumbopelvic motor control*

John Popovich, Jr.[1], Anthony Lewis[1], Angela Lee[1], Sloan Horejsi[1]

[1]*Michigan State University*

P1-233 *Scapular kinematic alterations and rotator cuff disease in breast cancer survivors*

Angelica Lang[1], Soo Kim[1]

[1]*University of Saskatchewan*

P1-234 *Acute effect of an intervention to improve ankle dorsiflexion on landing mechanics*

Rebecca Ban[1], Caroline Simpkins[1], Feng Yang[1]

[1]*Georgia State University*

P1-235 *The effect of multitasking on female soccer player jump landing kinetics: a pilot study*

Makayla Hoselton[1], Katherine Oatman[1], Samuel Nascak[1], Mostafa Hegazy[1]

[1]*Southwest Minnesota State University*

P1-236 *IMU based angular velocity profiles in figure skating: A preliminary investigation of jump types*

Sarah Ridge[1], Mia Caminita[2], Michael Jones[1], Dustin Bruening[1]

[1]*Brigham Young University,* [2]*University of Maryland*

P1-237 *Multiscale characterization of Type I collagen fibril stress- strain behavior under tensile load: Analytical vs. MD approaches*

Afif Gouissem, Raouf Mbarki[1], Fadi Alkhatib[2]

[1]*ACK,* [2]*Northwestern University*

P1-238 *Effect of botox injections on the morphology and mechanical properties of the inter-vertebral discs in rabbits*

Venus Joumaa[1], Muzammil Nasir[1], Chris Tiessen[1], Zain Tariq[1], Andrew Sawatsky[1], Tim Leonard[1], Walter Herzog[1]

[1]*University of Calgary*

P1-239 *Examining the protective role of the posterior elements of the spine against endplate fractures in a porcine model*

Noah Chow[1], John McMorran[1], Diane Gregory[1]

[1]*Wilfrid Laurier University*

P1-240 *Assessing the acute effects of wearable sensor derived auditory biofeedback on gross lumbar proprioception*

Aurora Battis[1], Shawn Beaudette[1]

[1]*Brock University*

P1-241 *Inter-operator reliability of fine-wire electromyography in the evaluation of eccentric elbow flexor activity*

Sarah Barron[1], Tamara Ordonez Diaz[1], Maximillian Diaz[1], Federico Pozzi[1], Jennifer Nichols[1]

[1]*University of Florida*

P1-242 *Investigating the association between objectively measured physical activity, core endurance and previous low back injury*

Placide Ilunga[1], Graham Mayberry[2], Janessa Drake[1]

[1]*York University,* [2]*University of Waterloo*

POSTER SESSION 2

Wednesday, August 24, 2022

P2-1 *The effects of age on lower extremity kinematic variability during obstacle crossing*

Mikaela Iturregui[1], Taylor Matson[1], Alison Schinkel-Ivy[1]

[1]Nipissing University

P2-2 *Small animal models used to study the effect of aging and menopause on the female pelvic floor muscles: A scoping review*

Olena Klahsen[1], Duane Hickling[1], James Ross[1], Linda McLean[1]

[1]University of Ottawa

P2-3 *Age-related challenges in reactive interlimb coordination in standing balance*

Sundeep Rakhra[1], Jonathan Singer[1]

[1]University of Manitoba

P2-4 *Exploring relationships between the control of standing balance and balance recovery*

Savannah Pohl[1], Jonathan Singer[1]

[1]University of Manitoba

P2-5 *Coupling between postural and supra-postural levels of control is negatively associated with performance of the supra-postural auditory-hand coordination task*

Dobromir Dotov[1], Laurel Trainor[1]

[1]McMaster University

P2-6 *Effects of virtual reality exercises for balance improvement in older adults: Meta-analysis*

JooHee Park[1], Hye-Seon Jeon[1], Ye Jin Kim[1], Gyeong Ah Moon[1], Yixin Wang[1], Ji-hyun Kim[1]

[1]Yonsei University

P2-7 *Responses to postural perturbations are highly individual and dependent on more than age-related changes between middle aged and older adults*

John Manning[1], Hyeon Kim[2], Julie Boron[2], Dawn Venema[3], Jennifer Yentes[1]

[1]Texas A&M University, [2]University of Nebraska at Omaha, [3]University of Nebraska Medical Center

P2-8 *Cervical range of motion in flexion and extension with respect to age and gender*

Rachel Tanczos[1], Sean Shimada[1]

[1]Biomechanical Consultants

P2-9 *Assessing pressure ulceration risk by utilizing existing risk factors and multibody dynamics modeling*

Jessi Martin[1], Brian Davis[1]

[1]Cleveland State University

P2-10 *How does age influence relationships between kinematics and postural stability during gait?*

Annagh Macie[1], Taylor Matson[1], Alison Schinkel-Ivy[1]

[1]Nipissing University

P2-11 *The effects of walking-related fatigue on EMG mean frequency and response to balance perturbations*

Hoon Kim[1], Yujin Kwon1, Andrew Shelton[1], Lillian Chilton[1], Jason Franz[1]

[1]University of North Carolina

P2-13 *Strength and variability of kinematic coupling during functional tasks: Differences between younger and older adulthood*

Emma McArthur[1], Taylor Matson[1], Trevor Kirk[1], Alison Schinkel-Ivy[1]

[1]Nipissing University

P2-15 *The Effect of Distributed Physical Activity on Gait in Older Adults with Chronic Pain*

Katherine Hsieh[1], Joy Furlipa[2], Amber Brooks[1], Jason Fanning[2]

[1]Wake Forest School of Medicine, [2]Wake Forest University

P2-16 *Old males show reduced motor flexibility during a seated, fatiguing, repetitive reaching task*

Matthew Slopecki[1], Christopher Bailey[2], Julie Côté[1]

[1]McGill University, [2]University of Ottawa

P2-17 *Predicting optimal experimental parameters for combined postural perturbations to measure age and loss of balance direction effects on the perturbation threshold line*

Gaspard Diotalevi[1], Cecile Smeesters[1]

[1]Universite de Sherbrooke

P2-18 *Investigation of equine hoof deformation using artificial neural network and finite element analysis*

Naeim Akbari Shahkhosravi[1], Helen Davies[1], Amin Komeili[2]

[1]The University of Melbourne, [2]University of Calgary

P2-19 *Full-body Motion Capture Protocol for Ovines and Other Quadrupeds*

Aaron Henry[1], Jordan Ankersen[2], Joshua Bertels[2], Dana Gaddy[2], Larry Suva[2], Michael Moreno[2], Andrew Robbins[2]

[1]Texas A&M University, [2]Texasam University

P2-20 *The effect of a 3-week delayed prebiotic fibre intervention on fat infiltration in rat vastus lateralis muscle in a diet-induced obesity model*

Hannah Smith[1], Elaine Nguyen[1], Nada Abu Ghazaleh[1], Ruth-Anne Seerattan[1], Walter Herzog[1]

[1]University of Calgary

P2-21 *Standardizing passive skeletal muscle mechanics: a systematic review of methodology*

Benjamin Binder-Markey[1], Danielle Sychowski[2], Richard Lieber[2]

[1]Drexel University, [2]Shirley Ryan AbilityLab

P2-22 *Effect of a high fat/high sucrose diet on vastus lateralis and soleus composition when combined or not with aerobic exercise and/or prebiotic fibre supplementation*

Heiliane de Brito Fontana[1], Jaqueline Rios[2], Ruth Seerattan[3], Venus Joumaa[3], David Hart[3], Raylene Reimer[1], Walter Herzog[3]

[1]Federal University of Santa Catarina, [2]University Medical Center Utrecht, [3]University of Calgary

P2-23 *Early alterations in forelimb grip strength and gait following brachial plexus birth injury*

Kyla Bosh[1], Jennifer Potts[1], Katherine Saul[2], Jacqueline Cole[1], Kerry Danelson[3]

[1]North Carolina State University & University of North Carolina - Chapel Hill, [2]North Carolina State University, [3]Wake Forest School of Medicine

P2-24 *Computer-aided methods to predict prostate MRI quality via rectal content estimation*

Abdullah Al-Hayali[1], Amin Komeili[2], Azar Azad[3], Nicola Schieda[4], Eran Ukwatta[1]

[1]University of Guelph, [2]University of Calgary, [3]AI. Vali. Inc, [4]The Ottawa Hospital

P2-25 *Opening the black box: a data-analytic framework for understanding unsupervised machine learning in biomechanics*

Calvin Young[1], Michele Oliver[1], Karen Gordon[1]

[1]University of Guelph

P2-26 *Center of mass estimation for gait control in spinal cord injury*

Gabrielle Labrozzi[1], Musa Audu[1], Holly Warner[1], Nathaniel Makowski[2], Ronald Triolo[3]

[1]Case Western Reserve University, [2]MetroHealth Medical Center, [3]Louis Stokes Cleveland Dept. of Veterans Affairs Medical Center

P2-27 *Running kinematics from markerless motion capture are consistent between clothing conditions and with marker-based motion capture*

Robert Kanko[1], Elise Laende[1], Jereme Outerleys[1], Kevin Deluzio[1]

[1]Queen's University

P2-28 *Assessment of Segment Length and Gait Spatiotemporal Sensitivity to Clothing Condition in Markerless Motion Capture*

Vajra Keller[1]

[1]Queen's University

P2-29 *The use of a deep neural network to estimate spine movement in a forward bending task: a pilot study*

Sangsoo Park[1], Sang Heon Lee[2]

[1]Korea Institute of Science and Technology, [2]Korea University

P2-30 *Utilizing Data From a Local Positioning System as Input Into a Neural Network to Determine Stride Length*

Pratham Singh[1], Michael Esposito[2], Zach Barrons[2], Christian Clermont[2], John Wannop[2], Darren Stefanyshyn[2]

[1]University of Toronto, [2]University of Calgary

P2-31 *Deep-learning based prediction of conventional gait model kinematics during running via inertial measurement sensors*

Guillaume Lam[1], Vaibhav Shah[1], Maxime Chabot[2], Martin Simoneau[1], Philippe Dixon[1]

[1]UdeM, [2]UdeL

P2-32 *Multivariate Time Series Clustering for Visualization of Telemeterized Implant Loads*

Adam Yu[1], Trevor Yu[1], Martine McGregor[1], Stewart McLachlin[1]

[1]University of Waterloo

P2-33 *A Machine Learning Scheme to Identify Falling for Lower Limb Amputees*

Mojtaba Mohasel[1], Lindsey Lewallen[2], Shane Wurdeman[3], Richard Neptune[4], Corey Pew[1]

[1]Montana State University, [2]University of Texas at Austin, [3]Hanger Clinic, [4]The University of Texas at Austin

P2-34 *Differences in neuromuscular coordination between novice and advanced sprinters*

Chris Vellucci[1], Shawn Beaudette[1]

[1]Brock University

P2-35 *Exploring the efficacy of portable lift-assist devices to reduce exposures compared to a manual lift*

Amanda Calford[1], Daphne Ho[1], Richard Ferron[2], Taylor Cleworth[3], Andrew Laing[1], Steven Fischer[1]

[1]University of Waterloo, [2]McMaster University, [3]York University

P2-36 *Methods and preliminary testing of a novel closed-loop fluidic regenerative system for dynamic unloading in uni-compartmental tibiofemoral osteoarthritis*

Run Ze Gao[1], Drew Werbowski[1], Christian Mele[1], Kendal Marriott[1], Monica Maly[1], Carolyn Ren[1]

[1]University of Waterloo

P2-37 *Ultrasonographic 3D reconstruction of and robot-assisted injection to the transverse carpal ligament*

Jocelyn Hawk[1], Hui Zhang[1], Zong-Ming Li[1]

[1]University of Arizona

P2-38 *Correlation of comfort, metabolic cost & muscle activation for an ankle exoskeleton*

Axl Maberry[1], Mohammed Mohammed El Husaini[1], Anne Martin[1]

[1]The Pennsylvania State University

P2-39 *A case study on the effects of a low-cost prosthetic knee on amputee gait over even and uneven terrains*

Jessica Aviles[1], Michael Madigan[2]

[1]Clemson University, [2]Virginia Tech

P2-40 *Compensatory mechanisms of individuals with above-knee amputation in response to steady-state walking speed and mobility classification*

Clayton Bliss[1], Tommaso Lenzi[1], Nicholas Fey[1]

[1]The University of Texas at Austin

P2-41 *Method for Predicting 3D Ground Reaction Forces Under Various Loading Patterns*

Evan Dooley[1], Shawn Russell[1]

[1]University of Virginia

P2-42 *Comparing gait quality metrics on their ability to distinguish between a tuned and untuned robotic prosthesis*

Samuel Kwak[1], Kinsey Herrin[1], Chase Rock[1], Young-Hui Chang[1]

[1]Georgia Institute of Technology

P2-43 *A passive hip flexion device may improve stability during perturbed walking*

Pawel Golyski[1], Fausto Panizzolo[2], Gregory Sawicki[1]

[1]Georgia Institute of Technology, [2]Moveo Srl

P2-45 *Design and evaluation of a bimodal prosthetic foot for walking and running*

David Ziemnicki[1], Stephanie Molitor[2], Jeremiah Egolf[1], Justin Cruz[3], Karl Zelik[1], Kirsty McDonald[4]

[1]Vanderbilt University, [2]University of Texas, [3]Northwestern University, [4]University of New South Wales

P2-46 *Adjustable Effort Bike Pedal System for Leg Rehabilitation*

jesse lozinski[1], Scott Brandon[1], Amin Komeili[2]

[1]University of Guelph, [2]University of Calgary

P2-47 *Assistance within electromechanical delay between muscle activation and contraction, a case study*

Alex Dzewaltowski[1], Philippe Malcolm[1]

[1]University of Nebraska at Omaha

P2-48 *Clutch Catch: The Prosthetic Baseball Glove*

Joseph Thomas[1], Grace Butler[1], Erika Antunes[1], Jordan Sweger[1], Eric Sipling[1]

[1]Elizabethtown College

P2-49 *Sensitivity of transient balance metrics to stimulus synchronization*

Nicholas Benson[1], Cody Reed[2], Kimberly Bigelow[3], Scott Monfort[1]

[1]Montana State University, [2]Sanford Health, [3]University of Dayton

P2-50 *Changes in balance control during dual-tasking and plantar temperature intervention*

Daniel Schmidt[1], Jesus A.N. Escalona[1], Katrin Karger[1], Thomas L. Milani[1], Felipe P. Carpes[2], Andresa M.C. Germano[1]

[1]Chemnitz University of Technology, [2]Federal University of Pampa

P2-51 *The impacts of mental fatigue on balance control*

Sarah Fitzgerald[1], Matthew McCue[1], Jeffrey Graham[1], Nick Wattie[1], Nicholas La Delfa[1]

[1]Ontario Tech University

P2-52 *Wearing a Backpack Affects Lower-Limb Muscle Activations During Balance Recovery by Stepping*

Kayley Elmblad[1], Jessica Pitts[2], Carly Siko[3], Derek Verbrigghe[3], Maury Nussbaum[4], Vicki Komisar[5], Carolyn Duncan[6]

[1]Michigan Technological University, [2]University of Illinois - Chicago, [3]Central Michigan University, [4]Virginia Tech, [5]University of British Columbia Okanagan, [6]Michigan Technological Institute

P2-53 *Reliability and validity of the angle measurements of inertial measurement unit sensors in headphone and necklace posture correction system for office workers*

Gyu-hyun Han[1]

[1]Yonsei University

P2-54 *Segmental frontal plane angular momentum during pre-planned and late-cued turns*

Jana Mucci[1], Mitchell Tillman[1], Jun M. Liu[1], Antonia Zaferiou[1]

[1]Musculoskeletal Control and Dynamics Lab

P2-55 *Motor adaptation in step width control following systematic mediolateral perturbations to foot placement: preliminary study*

Seongwoo Mun[1], Corbin Rasmussen[1], Nathaniel Hunt[1]

[1]University of Nebraska at Omaha

P2-56 *Does Locomotor Reaction Time Generalize Between Gait Initiation and Walking?*

Ellora McTaggart[1], Andrew Shelton[1], Jessica Allen[2], Vicki Mercer[3], Jeremy Crenshaw[4], Jason Franz[1]

[1]University of North Carolina at Chapel Hill and North Carolina State University, [2]West Virginia University, [3]University of North Carolina at Chapel Hill, [4]University of Delaware

P2-57 *Model analysis of abnormal foot placement in people with vestibular hypofunction*

Michelle Karabin[1], Mark Redfern[1], Hartmut Geyer[1]

[1]University of Pittsburgh

P2-58 *Changes to locomotor path trajectories following a visual perturbation*

Emily Vandenberg[1], Michael Cinelli[1]

[1]Wilfrid Laurier University

P2-59 *Effects of physical certainty of discrete underfoot perturbations on anticipatory and reactive balance*

Nicholas Kreter[1], Carter Lybbert[1], Tyler Ho[1], Peter Fino[1]

[1]the University of Utah

P2-60 *Comparison of obstacle clearance under mixed, virtual and physical reality environments*

Srikant Vallabhajosula[1], Alys Giordano[1], Pratheep Kumar Paranthaman[1], Oliver Tuisa[1], Stacey Walton[1], Sam Perri[1]

[1]Elon University

P2-61 *How should the margin of stability be expressed to account for body size?*

Nancy Nguyen[1], Michael Christensen[1], James Tracy[1], Grace Kellaher[1], Ryan Pohlig[1], Jeremy Crenshaw[1]

[1]University of Delaware

P2-62 *Gait performance is not affected by collegiate sports participation*

Thomas Buckley[1], Barry Munkasy[2], Jessie Oldham[3]

[1]University of Delaware, [2]Georgia Southern University, [3]Virginia Commonwealth University

P2-63 *A novel smartphone-based tool to quantify balance in individuals with Parkinson's Disease*

Vipul Lugade[1], Gurpreet Singh[1]

[1]Binghamton University

P2-64 *Influence of walking over uneven terrain on joint loading for individuals with lower-limb amputation*

Kristen Stewart[1], Glenn Klute[2], Richard Neptune[1]

[1]University of Texas at Austin, [2]VA Puget Sound

P2-65 *Identification of visual system contributions to the central nervous system in human postural control*

Amir Ghiasi Noughaby[1], Abolfazl Mohebbi[1], Robert Edward Kearney[2], Pouya Amiri[3]

[1]Polytechnique Montreal, University of Montreal, [2]McGill University, [3]Imperial College London

P2-66 *External loading during the rock step in three levels of ballroom dancers*

Meredith Wells[1], Caroline Simpkins[1], Feng Yang[1]

[1]Georgia State University

P2-67 *The Influence of Step Width on Frontal Plane Balance Control Following Mediolateral Perturbations During Healthy Walking*

Lindsey Lewallen[1], Gabriella Small[1], Richard Neptune[1]

[1]The University of Texas at Austin

P2-68 *Vestibular input modulates stepping balance reactions early in the pre-step phase through to post-recovery*

Brye McMorran[1], Leah Bent[1], John Zettel[1]

[1]University of Guelph

P2-69 *The Neuromechanics of Anticipated and Unanticipated Walking Balance Perturbations*

Emily Eichenlaub[1], Daniel Duque Urrego[2], Sahaj Sapovadia[3], Jessica Allen[4], Vicki Mercer[5], Jeremy Crenshaw[6], Jason Franz[1]

[1]University of North Carolina - Chapel Hill/North Carolina State University, [2]Universidad de Antioquia, [3]NC School of Science and Mathematics, [4]West Virginia University, [5]University of North Carolina - Chapel Hill, [6]University of Delaware

P2-70 *Quick on your feet: revamping the star excursion balance test with a response time task*

Christopher Hill[1], Sunny Jo Chandler[2], Abbey McCrory[2], Seth Freeny[2], Savannah-Kate Trigg[2], Reuben Burch[2], Adam Knight[2], Harish Chander[2]

[1]Northern Illinois University, [2]Mississippi State University

P2-71 *Differences in muscle activation pattern during a backward fall versus balance recovery*

Junwoo Park[1], Seungsu Kim[1], Woochol Joseph Choi[1]

[1]Yonsei university

P2-72 *Specificity Of Test Measures In Collegiate Athlete Balance Performance*

Ben Meyer[1]

[1]Shippensburg University

P2-73 *Sex-specific fatigue effects on principal components and complete kinematic time series in a repetitive pointing task*

Chen Yang[1], Yiyang Chen[1], Julie Côté[1]

[1]McGill University

P2-74 *Kinematic comparison between two active chairs, a traditional chair and standing*

Michelle Léger[1], Cynthia Dion[2], Wayne Albert[1], Michelle Cardoso[2]

[1]University of New Brunswick, [2]Université de Moncton

P2-75 *Can a sandwich structure of the helmet suspension padding provide a better oblique impact protection?*

Felipe Santos[1], Leonardo Wei[1], Suman Chowdhury[1]

[1]Texas Tech University

P2-76 *Lower limb dynamic fatigue analyses for a simulated childcare protocol*

Kimberly Peckett[1], Annemarie Laudanski[1], Stacey Acker[1]

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P2-77 *Relationship between knee joint angle and skin length deformation during dynamic motion*

Yongcheol Kim[1], Seonwoo Kim[1], Young June Shin[1], Myunghyun Lee[1]

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P2-78 *Evaluation of three pressure measurement systems on a load carriage simulator*

Adam Thompson[1], Qingguo Li[1], Michael Sherpertycky[1], Jun Tian Zhang[1], Tim Bryant[1], Evelyn Morin[1], Joan Stevenson[1], Adrienne Sy[2], Linda Bossi[2]

[1]Queen's University, [2]Defense Research and Development Canada

P2-80 *Reducing soft armour coverage increases shoulder pressure in females*

Rebecca Wendland[1], Linda Bossi[2], Ed Nakaza[3], Eliza Cazzola[1], Michele Oliver[1]

[1]University of Guelph, [2]Defence Research and Development Canada, [3]HumanSystems Incorporated

P2-81 *Comparison of movement during hand weaving and exercise using equipment designed for Burkinabe weavers*

Jordan Howes[1], Olivia Chisholm[1], Samuel Brost[1], Qinnguo Li[1], Charles Drysdale[1], Amidou Sawadogo[2]

[1]Queen's University, [2]Joseph Ki-Zerbo University

P2-82 *Asymmetric two-handed box lifting and the effect of handedness*

Jazmin Cruz[1], James Yang[2]

[1]Texas Tech University, [2]Human Centric Research and Design Lab (Texas Tech University under Dr. James Yang)

P2-83 *Differences in upper-limb isometric joint strength symmetry between left- and right-handed individuals*

Michael Watterworth[1], Fahima Wakeely[1], Sarah Fitzgerald[1], Nicholas La Delfa[1]

[1]Ontario Tech University

P2-84 *The Effect of Posture and Frequency on Perturbation Response, Fluid Distribution, and Isolated Annulus Fibrosus Material Response*

Mamiko Noguchi[1], Graham Mayberry[1], Jack Callaghan[1]

[1]University of Waterloo

P2-85 *Sex-specific fatigue detection during a repetitive pointing task using continuous wavelet transforms*

Yiyang Chen[1], Di Kang[2], Julie Côté[1]

[1]McGill University, [2]University of Ottawa

P2-86 *The effects of COVID-19 related shutdowns on perceived lifestyle and prevalence of musculoskeletal discomfort*

Daniel Cousins[1], Bailey Schaefer[1], Michael Holmes[1], Shawn Beaudette[1]

[1]Brock University

P2-79 *Evaluation of three pressure measurement systems on a flat and curved surface*

Adam Thompson[1], Qingguo Li[1], Jun Tian Zhang[1], Michael Shepertycky[1], Tim Bryant[1], Evelyn Morin[1], Adrienne Sy[2], Linda Bossi[2]

[1]Queen's University, [2]Defense Research and Development Canada

P2-87 *Comparing middle distance running spikes using a novel effort-based approach*

Ethan Wilkie[1], Jeremy Noble[1], Montgomery Bertschy[2], Wouter Hoogkamer[2]

[1]University of New Brunswick, [2]University of Massachusetts, Amherst

P2-88 *Inertial sensor-based analysis with summer and winter shoes elicited alterations in gait kinematics but not stability*

Sydney Garrah[1], Amy Wu[1], Aaron Best[1]

[1]Queen's University

P2-89 *Gait Analysis of Low-Cost Prosthetic Feet for Underserved Populations*

Kaleigh Renninger[1], Brevin Banks[1], Dustin Bruening[1]

[1]Brigham Young University

P2-90 *The Effect of Stiffness in a Novel Orthotic Insole on Ground Reaction Forces*

Sarah Hildreth[1], Lydia Brough[1], Richard Neptune[1]

[1]University of Texas at Austin

P2-91 *The effect of soccer cleat stud length on knee mechanics and muscle activity in females*

Emily Karolidis[1], Susan Sokolowski[1], Michael Hahn[1]

[1]University of Oregon

P2-92 *The effect of upper panel stiffness on biomechanical performance in athletic footwear*

Adam Luftglass[1], Daniel Feeney[2], Robin Queen[3]

[1]Granata Biomechanics Lab, [2]BOA Technology, [3]Virginia Tech

P2-93 *Age of first exposure to tackle football and repetitive head impact exposure*

Jaclyn Caccese[1], Carly Smith[1], Gregory Edwards[1]

[1]The Ohio State University

P2-94 *Rotational head acceleration in rear-end motor vehicle collisions and associated concussion risk*

James Michio Clark[1], Wade Baker[1], Jack Wheeler[1], Jeffrey Wheeler[1]

[1]*Vector Scientific, Inc.*

P2-95 *Validation of a multi-camera videogrammetry approach for quantifying helmet impact velocity in football*

Danielle Gyemi[1], David Andrews[1], Ron Jadischke[2]

[1]*University of Windsor,* [2]*Xenith, LLC*

P2-96 *The effect of safety modifications on head kinematics experienced during common skills in women's artistic gymnastics*

Nicholas Pritchard[1], Logan Miller[1], Joel Stitzel[1], Jillian Urban[1]

[1]*Wake Forest University School of Medicine*

P2-97 *Investigation of an ice hockey helmet test method representing three concussion event types*

Jarett Cutler[1], Andrew Meehan[1], Andrew Post[1], Thomas Hoshizaki[1], Michael Gilchrist[2]

[1]*University of Ottawa,* [2]*University College Dublin*

P2-98 *Inter-rater and intra-rater reliability of the GE Vscan dual-probe handheld ultrasound in the measurement of trochanteric soft tissue thickness*

Rebecca Knarr[1], Alyssa Tondat[1], Ethan Lawrence[1], Andrew Laing[1]

[1]*University of Waterloo*

P2-99 *Comparing joint space widths between rheumatoid arthritis and age- and sex-matched control metacarpophalangeal joints*

Justin Tse[1], Dani Contreras[1], Claire Barber[1], Glen Hazlewood[1], Cheryl Barnabe[1], Chris Penney[1], Sarah Manske[1]

[1]*University of Calgary*

P2-100 *Finite element analysis of μ-CT trabecular bone model: a numerical methodology to evaluate the influence of structural adaptation on biomechanical response*

Luis Pérez Pozo[1], Mauricio Campillo[1], Heidi-Lynn Ploeg[2], Juan Vivanco[3]

[1]*Universidad Técnica Federico Santa María,* [2]*Queen?s University,* [3]*Universidad Adolfo Ibáñez*

P2-101 *Morphological changes of the trapezium and first metacarpal with early thumb OA progression*

Amy Morton, Leah Peipert, Douglas Moore, Amy Ladd, Arnold-Peter Weiss, Janine Molino, Joseph Crisco

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P2-102 *The effect of fatigue on within-individual elbow load variability and UCL characteristics in baseball pitchers*

Bart van Trigt[1]

[1]*Delft University of Technology*

P2-103 *Three orthotic treatments of threee months for knee osteoaarthritis evaluated in a randomized crossover trial*

Xavier Robert-Lachaine[1], Yoann Dessery[2], Étienne Belzile[3], Philippe Corbeil[2]

[1]*IRSST,* [2]*Université Laval,* [3]*CHU de Québec / Université Laval*

P2-104 *Normalization methodologies involving anticipated cutting tasks*

Nathan Holland[1], Zachery Sievert[1], Hunter Bennett[1], Stacie Ringleb[1]

[1]*Old Dominion University*

P2-105 *Does trunk muscle asymmetry with lower limb loss affect spinal loads during forward bending?*

Courtney Butowicz[1], Babak Bazgari[2], Brad Hendershot[1]

[1]*DoD-VA Extremity Trauma & Amputation Center of Excellence,* [2]*University of Kentucky*

P2-106 *The Efficacy of Prophylactic Bracing On Shoulder Joint Position Sense*

Yunju Lee[1], Katherine Mullins[1], Elise Bancroft[1], Brian Hatzel[1]

[1]*Grand Valley State University*

P2-108 *Words matter: instructions dictate both stride length and cadence in young adults*

Sarah Brinkerhoff[1], William Murrah[1], Jaimie Roper[1]

[1]*Auburn University*

P2-109 *Margin of stability in the anterior-posterior direction is actively controlled during unobstructed and obstructed gait*

Ashwini Kulkarni[1], Chuyi Cui[1], Shirley Rietdyk[1], Satyajit Ambike[1]

[1]*Purdue University*

P2-110 *Effects of Prosthetic Stiffness, Mass, and Speed on Asymmetry in Female Runners with a Leg Amputation*

Kara Ashcraft[1], Kara Ashcraft[1]

[1]*University of Colorado Boulder*

P2-111 *Assessing statistical assumptions underlying magnitude-normalization of net joint moments during gait*

Steven Hirsch[1], Bas Van Hooren[1]

[1]*University of Toronto*

P2-112 *Effect of rhythmic auditory stimulation on gait patterns during treadmill walking*

Haneol Kim[1], Matt Beerse[2], Jianhua Wu[1]

[1]*Georgia State University,* [2]*University of Dayton*

P2-113 *Filtering considerations for gait analysis*

Terri Weeks[1], Daniel Mines[1], Stacey Acker[1]

[1]*University of Waterloo*

P2-114 *Dominant vs. NonDominant Knee Joint Contact Forces During Load Carriage*

Blake Jones[1], John Willson[1], Paul DeVita[1], Ryan Wedge[1]

[1]*East Carolina University*

P2-115 *Changes to stance limb plantar force and ankle joint flexion during assisted walking in patients with type 2 diabetes*

Jose Anguiano-Hernandez[1], Vijay Shivaswamy[2], David Kingston[1]

[1]*University of Nebraska Omaha,* [2]*University of Nebraska Medical Center*

P2-117 *Muscle Activation During Stroller Running*

Benjamin Infantolino[1], Joseph Mahoney[1], Allison Altman-Singles[1]

[1]*Penn State University - Berks*

P2-118 *The reflexive control of knee stability during movement*

Muhammet Berkan Kocer[1], Attiyeh Vasaghi[1], Alix Blacklin[1], Katinka Stecina[1]

[1]*University of Manitoba*

P2-119 *The control of leg external forces after fatigue*

Pawel Kudzia[1], James Wakeling[1], Max Donelan[1]

[1]*Simon Fraser University*

P2-120 *Asymmetry in propulsive forces during the acceleration phase of sprinting*

John Polk[1], David Kendziera

[1]*University at Albany*

P2-121 *The effects of cane support on frontal plane hip kinetics and kinematics in chronic stroke gait*

Emily Steffensen[1], Erica Hinton[1], Oluwaseye (Paul) Odanye[1], Lindsey Remski[1], Samuel Bierner[2], Brian Knarr[1]

[1]*University of Nebraska at Omaha,* [2]*University of Nebraska Medical Center*

P2-122 *Kinematic and Kinetic Determinants of Limb Force and Preferred Speed During Self-Paced Walking*

Daniel Duque Urrego[1], Richard Pimentel[2], Jason Franz[2]

[1]*Universidad de Antioquia,* [2]*University of North Carolina at Chapel Hill and North Carolina State University*

P2-123 *Ankle and pelvic strategies for step-aside from quiet standing*

Xie Lingchao[1], Cho Sanghyun[1]

[1]*Yonsei University*

P2-124 *Development of a markerless motion capture-driven OpenSim model of gait kinematics*

Christopher Bailey[1], Alexandre Mir-Orefice[1], Thomas Uchida[1], Julie Nantel[1], Ryan Graham[1]

[1]*University of Ottawa*

P2-125 *Changes in cumulative load in response to acute step length modifications in persons with ACL-reconstruction*

Steven Garcia[1], Derek Pamukoff[2], Alexa Johnson[1], Marissa Orzame[1], Riann Palmieri-Smith[1]

[1]*University of Michigan,* [2]*Western University*

P2-126 *Hip neuromechanics in female runners with previous iliotibial band syndrome examined via principal components analysis*

Eric Foch[1], Richard Brindle[2]

[1]*Central Washington University,* [2]*Shaw Sports Turf, Shaw Industries Group, Inc.*

P2-127 *Team coordination dynamics of winning NBA teams*

Alli Grunkemeyer[1], Joel Sommerfeld[2], Kolby Brink[2], Aaron Likens[2], Nicholas Stergiou[2]

[1]*UNO Biomechanics,* [2]*University of Nebraska at Omaha*

P2-128 *Validation of inertial measurement unit-based motion capture for assessing kinematics of gait in adults with obesity*

Julie Rekant[1], Emily Zuris[1], April Chambers[1]

[1]University of Pittsburgh

P2-129 *Muscle co-contraction in cerebral palsy during gait: A Scoping Review*

sahar mohammadyari gharehbolagh[1], Cloé Dussault-Picard[1], Denis Arvisais[1], Philippe Dixon[1]

[1]university of montreal

P2-130 *Adaptability of locomotor patterns during walking and turning in people with Parkinson's disease*

Carolin Curtze[1], Mukul Mukherjee[1], Jennifer Yentes[2]

[1]University of Nebraska Omaha, [2]Texas A&M University

P2-131 *The effects of limb selection method on gait outcomes related to falling in Parkinsons*

Sidney Baudendistel[1], Abigail Schmitt[2], Kate Balthaser[3], Frankie Wade[3], Chris Hass[3]

[1]Washington University in St. Louis, [2]University of Arkansas, [3]University of Florida

P2-132 *Does stretch activation contribute to mammalian slow-twitch muscle endurance?*

Douglas Swank[1], Chad Straight[2], Kaylyn Bell[1], Jared Slosberg[1], Mark Miller[1]

[1]Rensselaer Polytechnic Institute, [2]University of Massachusetts-Amherst

P2-133 *Synthesizing gait patterns characteristic of Duchenne muscular dystrophy using size- and strength-scaled musculoskeletal models*

Nathaniel Pickle[1], Garrett Tuer[1], Ridhi Sahani[2], Xiao Hu[2], Silvia Blemker[2], Paulien Roos[1]

[1]CFD Research Corporation, [2]University of Virginia

P2-134 *Plantar fascia strain and multi-segment foot kinematics during gait in individuals with plantar fasciitis*

Jeff Mettler[1], Erin Ward[2], Timothy Derrick[3]

[1]Augustana College, [2]Central Iowa Foot Clinic, [3]Iowa State University

P2-135 *Adaptive-cost motor regulation predicts how humans perform lateral maneuvers*

David Desmet[1], Joseph Cusumano[1], Jonathan Dingwell[1]

[1]Penn State University

P2-136 *Generalization of modular control across running and skipping*

Abigail Salvadore[1], John Willson[2], Paul DeVita[2], Richard Neptune[3], Sarah Roelker[1]

[1]University of Massachusetts, [2]East Carolina University, [3]University of Texas at Austin

P2-137 *Rewarding performance in a kinetics-based learning task facilitates locomotor learning*

David Young[1], Theresa McGuirk[1], Wandasun Sihanath[1], Karen Slesinger[1], Ryan Hobbib[1], Elliott Perry[1], Wilsaan Joiner[1], Carolynn Patten[1]

[1]University of California, Davis

P2-138 *Effects of optimal body weight support and gait speed parameters on leg muscle activity during interlimb ankle-knee-hip robotic gait in healthy adults*

Haeun Park[1], Baekdong Cha[1], Chanhee Park[1], Joshua (Sung) H. You[1]

[1]Yonsei University

P2-139 *Minimum Viable Muscle Set for Identifying Impairments in the Neuromuscular Control of Walking Using the Dynamic Motor Control Index*

Ashley Collimore[1], Ryan Pohlig[2], Louis Awad[1]

[1]Boston University, [2]University of Delaware

P2-140 *Statistical model selection and uncertainty reporting using approximate Bayesian Techniques*

Michael Madigan[1], Sara Arena[1], Christopher Franck[1]

[1]Virginia Tech

P2-141 *The Impact of Running Experience on Segment Coordination Variability*

Jared Steele[1], Kaleigh Renninger[1], Cameron Weeks[1]

[1]Brigham Young University

P2-142 *Individuals with chronic low back pain show decreased gait symmetry despite intact gait speed and variability*

Anna Bailes[1], Marit Johnson[1], Mark Redfern[1], Harold Cook[1], Kevin Bell[1]

[1]University of Pittsburgh

P2-143 *The influence of prolonged kneeling on frontal plane knee stiffness*

David Varandas[1], Daniel Mines[1], Stacey Acker[1]

[1]University of Waterloo

P2-144 *Gait simulations emphasize the lack of data supporting optimal AFO alignment*

Carlee Rowell[1], Benjamin Shuman[2], Elizabeth Esposito[3]

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P2-145 *An optoelectronic motion capture protocol for in-clinic orthopaedic gait analysis*

Monica Malek[1], Anthony Adili[1], Kim Madden[1], Vickas Khanna[1], Janie Wilson[1]

[1]McMaster University

P2-146 *Easy-To-Use MATLAB Software for Personalizing Joint Parameters in OpenSim Musculoskeletal Models*

Claire Hammond[1], Mohammad Shourijeh[1], Benjamin Fregly[1]

[1]Rice University

P2-147 *Development and application of a musculoskeletal model to investigate hip joint mechanics during a variety of functional tasks*

Margaret Harrington[1], Timothy Burkhart[1]

[1]University of Toronto

P2-148 *Varus thrust in knee osteoarthritis: A scoping review*

Dylan Kobsar[1], Zaryan Masood[1], Joshua Keogh[1], Matthew Ruder[1]

[1]McMaster University

P2-149 *Can unilateral drop landings outperform bilateral in building bone?*

Andrew Wilzman[1], Logan Gaudette[1], Karen Troy[1]

[1]Worcester Polytechnic Institute

P2-150 *Investigating the Relationship Between Pre-Operative Gait Parameters and Arthroplasty Patients' Self-Report Function and Pain*

Fatemeh Jazinizadeh[1], Monica Malek[1], Kim Madden[1], Anthony Adili[1], Vickas Khanna[1], Lisa Carlesso[1], Dylan Kobsar[1], Janie Wilson[2]

[1]McMaster University, [2]Dalhousie University

P2-151 *Distinguishing patterns of limb coordination in high-speed running using topology*

Abdullah Zafar[1]

[1]Sport Performance Analytics Inc.

P2-152 *Hip adduction coordination during lateral step-downs*

Joaquin Barrios[1], Allison Kinney[1]

[1]University of Dayton

P2-153 *Relationship between sagittal plane hip and knee coordination and non-sagittal plane knee moments*

Eric Dugan[1], Sierra Hastings[2], Jake Melaro[3], Joshua Weinhandl[3]

[1]Baylor College of Medicine, [2]Texas Children's Hospital, [3]The University of Tennessee

P2-154 *How Drive Leg Impulse and Slope Affect Kinematics and Pitch Speed*

Joseph Mylott[1], Eric Dennis[1], Kristen Nicholson[1], Mark Glover[1], Andrew Recker[1]

[1]Wake Forest School of Medicine

P2-155 *Comparing reliability of sensor-to-segment alignment techniques*

Julien Mihy[1], Mayumi Wagatsuma[1], Stephen Cain[2], Jocelyn Hafer[1]

[1]University of Delaware, [2]West Virginia University

P2-156 *Joint Movement Reconstruction in Long-Term Real-World Tracking*

Yisen Wang[1], Katherine Fehr[1], Peter Adamczyk[1]

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P2-157 *Active and passive force-length relations in Joint Hypermobility Syndrome*

Donald Golden[1], Kalindra Walls[1], Jason Oliemans[1], Eric Bennett[1], Esthevan Machado[1], Spencer Skaper[1], Jared Fletcher[1]

[1]Mount Royal University

P2-158 *Individuals with medial compartment underloading 6-months after anterior cruciate ligament reconstruction walk with asymmetric knee muscle co-contractions*

Abdulmajeed Alfayyadh[1], Kelsey Neal[1], Jack Williams[1], Ashutosh Khandha[1], Kurt Manal[1], Lynn Snyder-Mackler[1], Thomas Buchanan[1]

[1]University of Delaware

P2-159 *Validation of the countermovement jump as a measure of lower-limb neuromuscular fatigue*

Owen Lindsay[1], Jared Fletcher[1]

[1]Mount Royal University

P2-160 *Does muscular fatigue influence lower extremity joint power?*

Shelby Peel[1], Jake Melaro[2], Joshua Weinhandl[2]

[1]University of Southern Mississippi, [2]University of Tennessee, Knoxville

P2-161 *Building personalized musculoskeletal models for predictive simulations of walking in children with CP: a case study*

Bram Van Den Bosch[1], Lars D'Hondt[1], Ilse Jonkers[1], Anja Van Campenhout[2], Kaat Desloovere[2], Friedl De Groote[1]

[1]KU Leuven, [2]UZ Leuven

P2-162 *A finite element model of the lower limb for simulating football impacts*

Eden Lazar[1], Cheryl Quenneville[1]

[1]McMaster University

P2-163 *Small treadmill belt perturbations at mid-stance modulate propulsive force more than perturbations at heel strike*

Jinfeng Li[1], Helen Huang[1]

[1]University of Central Florida

P2-164 *Quantification of bone-block movement in rectangular bone tunnels after acl reconstruction using bone-patellar tendon-bone grafts*

Michele Matsubara[1], David Holdsworth[2], Alan Getgood[2], Timothy Burkhart[1]

[1]University of Toronto, [2]Western University

P2-165 *ACL injured adolescents employ asymmetrical contribution between lower limbs during the countermovement jump*

Joana F. Hornestam[1], Blake Miller[1], Sasha Carsen[1], Daniel Benoit[1]

[1]University of Ottawa

P2-166 *Targeted, physiological stress of the meniscus using bio-robotic system*

Alexander Hooke[1], Daniel Jacobson[1], Martin Husen[1], Chunfeng Zhao[1], Daniel Saris[1]

[1]Mayo Clinic

P2-167 *Young people increase joint moments in response to external loads during a step-up task*

Vatsala Goyal[1], Keith Gordon[1], Theresa Sukal-Moulton[1]

[1]Northwestern University

P2-168 *Kinematic and kinetic asymmetries during squats and countermovement jumps in collegiate athletes following anterior cruciate ligament reconstruction*

Yu Song[1], Ling Li[1], Megan Jensen[1], Boyi Dai[1]

[1]University of Wyoming

P2-169 *Effects of prosthesis & bike configuration in recreational riders recreation riders with unilateral transtibial amputation*

Stephen Allen[1], Alena Grabowski[1]

[1]University of Colorado Boulder

P2-170 *Tracking the reliability of force plate-derived countermovement jump metrics over time in female basketball athletes: A comparison of principal component analysis vs. conventional methods*

Joshua Keogh[1], Chris Bishop[2], Matthew Ruder[1], Dylan Kobsar[1]

[1]McMaster University, [2]Middlesex University

P2-171 *The effects of interfoot distance on hip joint kinetics during bilateral drop landings*

Jake Melaro[1], Joshua Weinhandl[1]

[1]University of Tennessee, Knoxville

P2-172 *An investigation into peak tibial acceleration and physiological response for outdoor exercise while utilizing a jogging stroller*

Corey Pew[1], Veronica Soran[1]

[1]Montana State University

P2-173 *Tibial accelerations of collegiate cross-country runners during a long run*

Samuel Rosario[1], Micah Garcia[1], David Bazett-Jones[1]

[1]University of Toledo

P2-174 *Analyzing lower-limb muscle activations while wearing a passive vs dynamic osteoarthritis knee brace*

Marija Bakoc[1], Olivia Roud[1], Karen Gordon[1], Scott Brandon[1]

[1]University of Guelph

P2-175 *Effect of polymer surface texturing on stress in UHMWPE-steel bearing systems for joint arthroplasty*

Jordan Bradshaw[1], Tim Bryant[1]

[1]Queen's University

P2-176 *The impact of heavy equipment on a soldier's movement: application of markerless motion capture for military assessment*

Isabel Coll[1], Matthew Mavor[1], Allison Clouthier[1], Ryan Graham[1]

[1]*University of Ottawa*

P2-177 *Muscle strength scaling for musculoskeletal modeling of military populations*

Allison Tanner[1], Hedaya Rizeq[2], Amy Silder[2], Adam Bunn[2], Pinata Sessoms[2], Anne Silverman[1]

[1]*Colorado School of Mines,* [2]*Naval Health Research Center*

P2-178 *Walking Slope and Backpack Design Affect Trunk Muscle Activity During Load Carriage*

Jordan Sturdy[1], Hedaya Rizeq[2], Amy Silder[2], Pinata Sessoms[2], Anne Silverman[1]

[1]*Colorado School of Mines,* [2]*Naval Health Research Center*

P2-180 *Visual Biofeedback During Overground Walking Increases Walking Speed in Individuals Post-Stroke*

Erica Hinton[1], Emily Steffensen[1], Samuel Bierner[2], David Kingston[1], Nick Stergiou[1], Trisha Kesar[3], Brian Knarr[1]

[1]*University of Nebraska at Omaha,* [2]*University of Nebraska Medical Center,* [3]*Emory University School of Medicine*

P2-181 *Knee joint neuromechanics during different volleyball approach jumps*

Jessica Julian[1], Nayun Ahn[1], Kristof Kipp[1]

[1]*Marquette University*

P2-182 *On the effect of different spinopelvic parameters, spine stiffness, and spine fusion surgery on motion following total hip arthroplasty*

AliAsghar MohammadiNasrabadi[1], John McPhee[1]

[1]*University of Waterloo*

P2-183 *An Instrumented Toilet Seat for Analyzing Sit-to-Stand*

Patrick Slade[1], Melissa Boswell[1], Antonio Pulito[1], Justin Myles[1], Scott Delp[1]

[1]*Stanford University*

P2-184 *Synergistic Control of Hand Kinematics during Simulated Nordic Skiing*

Devon Frayne[1], Valerie Norman-Gerum[1], Samuel Howarth[2], Stephen Brown[1]

[1]*university of guelph,* [2]*Canadian Memorial Chiropractic College*

P2-185 *Transverse Plane Trunk Kinematics in Individuals with Spinal Fusions for Adolescent Idiopathic Scoliosis*

Seth Higgins[1], Rumit Kakar[1]

[1]*Oakland University*

P2-186 *Altered hip and knee kinematics during a forward step-down in men with patellofemoral pain*

Thomas Hulcher[1], Amy Amabile[1], Jeremy Close[1], Michael Mallow[1], Ricker Adkins[1], Marc Harwood[2], Kelly Pagnotta[1], Lisa Hoglund[1]

[1]*Thomas Jefferson University,* [2]*Rothman Institute*

P2-187 *Spine-pelvis-hip angles during sit to stand in patients that had total hip arthroplasty and lumbar spine fusion*

Patrick Ippersiel[1], Evangelos Tyrpenou[2], Daniel Lee[1], John Antoniou[2], Shawn Robbins[1]

[1]*McGill University,* [2]*Jewish General Hospital*

P2-188 *Center of pressure while standing and treadmill walking: indicators of dynamic stability in children with cerebral palsy.*

Jutharat Poomulna[1], Nickolas Nahm[2], David Kingston[1]

[1]*University of Nebraska at Omaha,* [2]*University of Nebraska Medical Center*

P2-189 *Influence of maturation and sex on kinetics in adolescent long-distance runners*

David Bazett-Jones[1], Micah Garcia[1]

[1]*University of Toledo*

P2-190 *Influence of Spinal Cord Injury Level on Variability of Wheelchair Handrim Kinetics*

Caleb Cordes[1], Matthew Hanks[1], Shubhra Mukherjee[2], Alyssa Schnorenberg[1], Brooke Slavens[1]

[1]*University of Wisconsin-Milwaukee,* [2]*Shriners Hospitals for Children-Chicago*

P2-191 *The MilestonePod and motion capture produce comparable spatiotemporal parameters in runners with and without Achilles tendinopathy*

Kayla Seymore[1], Patrick Corrigan[2], Haraldur Sigurðsson[3], Karin Grävare Silbernagel[1]

[1]University of Delaware, [2]Saint Louis University, [3]University of Iceland

P2-192 *Impact of stride length on sagittal hip dynamics in baseball pitching*

Dan Ramsey[1], Ryan Crotin[2]

[1]D'Youville, [2]Louisiana Tech University

P2-193 *Kinematics and kinetics of the lumbosacral joint during the baseball pitch*

Moira Pryhoda[1], Jacob Howenstein[2], Kristof Kipp[3], Michelle Sabick[1]

[1]University of Denver, [2]Blast Motion, [3]Marquette University

P2-194 *Equivalence and reliability of baseball pitching kinematics using markerless and marker-based motion capture*

Arnel Aguinaldo[1]

[1]Point Loma Nazarene University

P2-195 *Influence of individualized low-pass filter cutoff frequencies on vertical jump peak forces and rates of force development*

Malinda Hapuarachchi[1], Robert Mackowiak[2], Luc Tremblay[1], Tyson Beach[3]

[1]University of Toronto, [2]Queen's University, [3]University of Waterloo

P2-196 *Ice hockey goaltender leg pad performance*

Alex Peddle[1], Ryan Frayne[1], Seth Daley[1]

[1]Dalhousie University

P2-197 *Puck speed is related to trunk rotation during ice hockey slap shots*

Shawn Robbins[1], Philippe Renaud[1], Neil MacInnis[2], David Pearsall[1]

[1]McGill University, [2]Curv Health

P2-198 *Ankle and hip mobility influence low-back control during movement tasks that do not require ankle and hip mobility*

Kyle Farwell[1], Anthony Belza[1], Adrian Lightowler[1], David Frost[1]

[1]University of Toronto

P2-199 *Does body fat percentage influence movement asymmetry in softball pitchers?*

Kenzie Friesen[1], Angelica Lang[1], Gretchen Oliver[2]

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Tessa Hulburt[1], Tessa Hulburt[1], Garrett Bullock[1], Arnel Aguinaldo[2], Kristen Nicholson[1]

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Farzad Aghazadeh Shabestari[1], Bin Zheng[1], Mahdi Tavakoli[1], Hossein Rouhani[1]

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Natalie Bick[1], Mark Redfern[2], Ian Conner[2], Gadi Wollstein[3], Kevin Chan[3], Caitlin O'Connell[4], Rakie Cham[2]

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Michel Demuynck[1], Aidin Delnavaz[1], Jérémie Voix[1]

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Maruti Gudavalli[1], Ralph Kruse[1], Bret White[1], Stacey Rider[2]

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Cameron Leonard[1], John Challis[1]

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Ali Nasr[1], John McPhee[1]

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Blake Miller[1], Joana Hornestam[1], Sasha Carsen[2], Daniel Benoit[1]

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Marleny Vega[1], Geng Li[1], Mohammad Shourijeh[1], Di Ao[1], Robert Weinschenk[2], Carolynn Patten[3], Josep Font-Llagunes[4], Valerae Lewis[5], Benjamin Fregly[1]

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Victor Caranza[1], Ryan Willing[1], Alam Getgood[1], Timothy Burkhart[2]

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Wissal Mesfar[1], Mohamed Zoubeir Bendjaballah[1]

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Claire Warren[1], Michele Conconi[2], Nicola Sancisi[2], Sasha Carsen[3], Daniel Benoit[1]

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Caitlin Banks[1], Elliott Perry[2], Wandasun Sihanath[1], Theresa McGuirk[2], Carolynn Patten[1]

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Mona Frey[1], Samuel Howarth[2], Diana De Carvalho[1]

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Chi Whan Choi[1]

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Nathaniel Bates[1], Evelyn Goodyear[1], Allison Huffman[1], Takashi Nagai, Luca Rigamonti[2], Logan Breuer[3], Benjamin Holmes[3], Nathan Schilaty[4]

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Lisa Ek Orloff[1], Michael Del Bel[1], Nicholas Romanchuk[1], Sasha Carsen[2], Pascal Imbeault[1], Daniel Benoit[1]

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Heather Johnston[1], Janessa Drake[2]

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Taylor Winberg[1], Jackie Zehr[1], Rob Parkinson[2], Jack Callaghan[1], Andrew Laing[1]

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Glenn Paulley[1], John Newhook[2], Ryan Frayne[2], Michel Ladouceur[2]

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Thomas Madden[1], David Hawkins[1]

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Sabrina Sinopoli[1], Diane Gregory[1]

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