28th Conference of the International Society of Biomechanics in Sports

July 19-23, 2010
Northern Michigan University
Marquette, Michigan USA

Randall Jensen
Department of Health Physical Education and Recreation
College of Professional Studies
Northern Michigan University
Welcome to ISBS 2010

On behalf of the International Society of Biomechanics in Sports and Northern Michigan University we are very happy to welcome all delegates of the 28th Conference of the International Society of Biomechanics in Sports to Marquette and the Upper Peninsula of Michigan.

While planning the program for this meeting we have tried to keep in the forefront the mission of ISBS to bridge the gap between scientists and practitioners in sport biomechanics. We believe we have accomplished this with an excellent applied program, keynote lectures, and for the first time, a thematic session on Paralympic Sports. This session will be comprised of posters with an abbreviated oral presentation to summarize the paper. An extended question and answer session will allow for audience participation.

This year’s applied sessions include Nordic Skiing, chaired by Gerald Smith; Olympic Weightlifting, chaired by Andy Tysz; Motion Analysis, chaired by Rene Ferdinands; Feedback to Athletes, chaired by Kevin Ball; Gymnastics, chaired by Gareth Irwin; and Writing and Reviewing Manuscripts, presented by Young-Hoo Kwon, the editor of the Society’s journal, Sports Biomechanics.

As usual, the Geoffrey Dyson Award is a major highlight of the ISBS conference and for 2010, Barry Bates will present a lecture titled “Accommodating Strategies for Preventing Chronic Lower Extremity Injuries.” The program also includes keynote lectures by Karen Roemer (USA), Justin Keogh (New Zealand), Andrew Harrison (Ireland), Thorsten Strerzing (Germany), Glenn Fleisig (USA), Elizabeth Bradshaw (Australia), and Ezio Preatoni (Italy). The scientific program is filled out with 90 oral presentations and 107 posters covering a wide range of sports biomechanics.

In addition to the regular program, we are pleased to include a Preconference Symposium on Teaching Biomechanics in conjunction with members from Biomechanics Academy of the National Association for Sport and Physical Education (NASPE). The symposium will incorporate suggestions for novel and online teaching techniques, variations of capstone projects, and roundtables on dealing with different types of students and situations in the classroom.

The scientific and applied sessions will be complemented by a display of equipment, software, and literature related to sport biomechanics by leading commercial vendors in the field.

The Upper Peninsula (known locally as the U.P.) is famous for its outdoor activities and ISBS 2010 will take full advantage of this. On Tuesday, we will have an Adventure Activities Afternoon. Delegates and accompanying persons will enjoy hiking through the woods with views of Lake Superior (the largest freshwater lake in the world), kayaking on the lake, canoeing one of our scenic rivers, rock climbing in NMU’s first-class recreation facility, or touring an open pit iron mining operation. On Thursday we will enjoy a picnic on the shores of Lake Superior before experiencing the impressive Pictured Rocks National Lakeshore during an evening boat cruise.

In hosting ISBS 2010 we will do our best to ensure your time at the conference and in the U.P. is a memorable one, with an excellent scientific, social, and cultural experience. We hope that you will enjoy your time enough to wish to return again.

Randall Jensen
ISBS 2010 Conference Chair
THE PEOPLE

Conference Chair
Randall Jensen

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Randall Jensen, Rebecca Tavernini, Phil Watts

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Gerald Smith, USA
Thorsten Sterzing, Germany
Jake Streepy, USA
Lothar Thorwesten, Germany
Antonio Veloso, Portugal
Manfred Vieten, Germany
Mark Walsh, USA
Cassie Wilson, UK
Jason Winchester, USA
Kerstin Witte, Germany
Bing Yu, USA
CONFERENCE DETAILS

Conference Office
The ISBS Conference Office is located in the Superior Room of the University Center where Registration Check-in will take place. The conference office hours are:

- Sunday, 18 July: 15:00-18:00
- Monday, 19 July: 08:00-18:30
- Tuesday, 20 July: 07:45-16:00
- Wednesday, 21 July: 08:00-18:00
- Thursday, 22 July: 08:00-16:00
- Friday, 23 July: 08:00-16:00

The conference organizers can be contacted from 07:30 to 16:30 Eastern Daylight Time at 1-906-227-2130 prior to the conference. During the conference please phone 1-906-204-4274. This number will be available and monitored 24/7.

Name Badges
You will obtain a name badge when you check in at registration. Please make sure you wear your badge at all times during the conference activities. The badge allows delegates entry to all conference activities including the scientific program and social activities. It also will be the entrance ticket for accompanying persons to the social activities.

Conference Staff
Conference staff will be available to assist you and answer questions throughout the conference. All conference staff will be identifiable by the ISBS conference shirts with STAFF printed on the shirt.

Lunch and Breaks
Lunch will be served in the Peter White Lounge located one floor below the conference venue. Breaks will be served in the Exhibit Hall of the Explorer Rooms.

Speaker Ready Room
The speaker ready room is located across from the Exhibit Hall in Pioneer A. We ask that all presenters load their presentations onto the ISBS 2010 laptops in the speaker ready room according to the schedule that will be posted. ALL speakers are required to load their presentations onto the ISBS 2010 laptops prior to their presentation. The hours for the speaker ready room are:

- Sunday, 18 July: 15:00-18:00
- Monday, 19 July: 08:00-18:30
- Tuesday, 20 July: 07:45-16:00
- Wednesday, 21 July: 08:00-18:00
- Thursday, 22 July: 08:00-16:00
- Friday, 23 July: 08:00-16:00

Geoffrey Dyson Award
The Geoffrey Dyson Award is the most prestigious award of the ISBS. The award is given to an individual in recognition of work in Sports Biomechanics that exemplifies the ISBS mission to bridge the gap between academic research and sports practice. This year’s recipient of the Geoffrey Dyson Award is Dr. Barry Bates, University of Oregon professor emeritus, adjunct professor at the University of Nevada-Las Vegas and president of Human Performance & Wellness, Inc. His interests and activities include: human performance/human factors consulting, forensic services, biomechanics research, lower extremity function, running and running injuries, athletic footwear expertise, backward (retro) locomotion, exercise equipment design and evaluation and single subject performance strategies. The 2010 Geoffrey Dyson Award Lecture will take place on Tuesday, 20 July at 08:30 to 09:20. The title of the presentation is: “Accommodating Strategies for Preventing Chronic Lower Extremity Injuries.”

Hans Gros New Investigator Award
The Hans Gros New Investigator Award will include separate awards for the best oral and best poster papers by young investigator entrants. The best papers will be selected by a panel of judges appointed by the vice president of awards. The judges will select the best two oral presentations and these papers will be presented to all delegates and the judges at the final session of the conference. The award winners will be announced at the closing banquet.
Scientific Program
The scientific program for ISBS 2010 includes the Geoffrey Dyson Lecture, seven keynote lectures, six applied sessions, a thematic session on paralympics with eight presentations, 20 oral sessions with 90 presentations, and four poster sessions with 107 presentations.

Applied Program
ISBS 2010 is pleased to offer six applied sessions for delegates to attend. These include sessions on: Nordic Skiing Mechanics and Physiology (Chair - Gerald Smith); Olympic Weightlifting (Chair – Andy Tysz); Motion Analysis (Chair - Rene Ferdinands); Feedback to Athletes (Chair – Kevin Ball); Writing and Reviewing Manuscripts (Chair – Young-Hoo Kwon); and Gymnastics (Chair – Gareth Irwin). With the exception of the session on Olympic Weightlifting, all applied sessions will be held in the Charcoal Room of the University Center. The Olympic Weightlifting session will be held in the Superior Dome (reference 3 on the campus map). The walk to the Superior Dome will take approximately 10 minutes and those participating are asked to gather outside the registration check-in desk immediately after the keynote lecture, where an ISBS 2010 representative will guide you to the session.

Technical Exhibition
A technical exhibition by 14 international exhibitors will take place in the Exhibition Hall also known as the Explorer Rooms. The Exhibition Hall will be the location of the morning break and poster presentations. Open hours are:

- Monday, 19 July 08:00 – 16:15
- Tuesday, 20 July 08:00 – 15:30
- Wednesday, 21 July 08:00 – 18:00
- Thursday, 22 July 08:00 – 15:30
- Friday, 23 July 08:00 – 12:00

Thematic Session
ISBS 2010 is pleased to present a thematic poster session on Disabled Sports and the Paralympics. This session will feature eight papers that will be presented as posters in addition to an abbreviated five minute oral presentation. The audience will be invited to participate in the question and answer session. The session will take place from 14:00 to 15:30 on Tuesday, 20 July in the Pioneer B room across from the Exhibition Hall. Posters will be available for viewing beginning at 10:00.

Oral Presentations
Oral presentations (excluding keynotes) will be 10 minutes followed by 5 minutes of questions. All presenters are required to use the ISBS 2010 laptops and the presentation must be compatible with Microsoft PowerPoint 2003 or later. We ask that presenters load their presentation onto the ISBS 2010 laptops in the Speaker Ready Room according to the posted schedule. Please test your presentation to see that it is copied and runs properly. This is especially important if you plan to use video or animation files as part of your presentation. Please report to the scheduled presentation room at least 10 minutes before the start of the session in which you are presenting and introduce yourself to the session chairperson. A laser pointer/remote control for the laptop will be provided. The session chairperson will ensure that all presentations run on time.

Posters
Posters should be prepared in A0 size (841mm x 1189mm or 33.11” x 46.81”) in a PORTRAIT format; i.e. tall. Each poster presenter will be provided a poster number to identify the location of their poster in the Exhibit Hall (Explorer Rooms). Posters should be fixed in their location between 8:00 and 9:30 on the day of presentation and removed after 12:00. Please use Velcro tape provided by ISBS 2010 to fix your poster to the wall. Poster presenters are required to be present at their poster during the scheduled time and to answer questions of the delegates regarding it.

Annual General Meeting of ISBS
The annual general meeting of ISBS is scheduled for Friday 23 July from 13:00-14:00 in the Lakes Room (Conference Map Location 1). All members in good standing are encouraged to participate and contribute to the meeting.

Internet Access
Wireless internet access is available in all Northern Michigan University buildings. “NMU_GUEST” is the network delegates should search for on their
laptops. In addition, desktop computers are located in the university library (reference 4 on the map) located only 5 minutes walk away from the conference venue.

**Airport Transfers**
ISBS 2010 will provide shuttle service from Marquette’s K. I. Sawyer airport at 10:30, 15:30, 17:00, and from 21:00 to 22:00 on 18 and 19 July. In addition, there will be a shuttle from the airport in Green Bay, Wisconsin, at 16:00 CDT on 18 July and 12:00 CDT on 19 July. Car rentals are available at both airports. For those arriving at other times, taxi and bus service are available to use within and around Marquette. The phone number of the local bus line (Marq-Tran) is 1-906-225-1112. Taxis can be arranged from the following phone numbers: 1-906-226-7777; 1-906-249-4428; or 1-906-226-9999.

**Accommodation**
**On-campus housing is in Magers/Meyland Hall**
Those who have booked on-campus accommodations will be housed in Magers/Meyland Hall (reference 2 on the map). Please go directly to the Magers/Meyland Hall front desk to pick up the key to your room. Normal hours for the front desk are 8:00 to 16:00 and 18:00 to 20:00. Extended hours will take place on Sunday and Monday. For arrivals after 20:00 a member of the staff will be on call. Directions will be posted on the front door advising how to contact the on-call staff member. Please note that check out is at noon on the day of departure. Luggage can be stored at the front Desk during the day prior to departure. Lots 14 and 24 allow overnight parking for those staying in Magers/Meyland Hall.

**Campus Parking**
If you are driving to the conference, please take note of the signage on campus relating to parking. There are parking lots next to the conference venue at the University Center (Lot 8) and near to Magers/Meyland Hall for those with on-campus accommodations (Lots 14 & 24). Parking is free, however, parking contrary to any posted signs will result in a parking ticket.

**Sports Facilities**
We have secured the use of the Physical Education Instructional Facility (PEIF) (Conference Map Location 3) for all of our delegates; please show your conference badge to gain admission—see http://webb.nmu.edu/SportsAthletics/SiteSections/Facilities/PEIF.shtml for a summary of the facilities. For those interested in walking or running, a map with routes is available at check in.

**After Hours**
NMU Conference and Catering will host the ISBS 2010 Pub in the University Center’s Charcoal Room, on the second floor, Tuesday and Wednesday 20:00-23:30. A cash bar will be available to conference delegates.
APPLIED SESSIONS

The applied program of ISBS 2010 consists of five two-hour sessions and a one-hour session on scientific writing as well as a 90-minute thematic session on Paralympic Sports. Please see the Proceedings on your ISBS jump drive for papers and authors.

Nordic Skiing provides unique movement patterns and unique athletes for sport science research. The integration of physiology and biomechanics into research projects has provided insights into systemic solutions regarding high intensity, whole body exercise and how workload is distributed. This session will review research into technique and training for Nordic skiing.

Gerald Smith (Chair), Utah State University, USA
Hans-Christer Holmberg, Swedish Winter Sports Research Centre, Sweden

Time and Room: Tuesday, 9:45 to 12:00, Charcoal Room University Center

Olympic Weightlifting can be used as a training regimen as well as a competitive sport. This session will focus on the sporting aspect, including performance cues for lifting, formation of a training regimen, and developmental aspects of weightlifting athletes. Demonstration of techniques will be included in this session.

Andy Tysz (Chair), United States Olympic Education Center, USA
Kyle Pierce, Louisiana State University-Shreveport, USA

Time and Room: Wednesday, 9:45 to 12:00, Superior Dome Weightlifting Center

Motion analysis is utilized to capture information of a body performing a movement sequence in sport. The application of motion analysis involves biomechanical modeling to calculate various kinematic and kinetic derived variables to understand the principles of motion. Techniques to accomplish this are often varied and interrelated. The presenters of this session will provide background in different methods of state of the art motion analysis in the lab and on the field, court, or water.

Rene Edouard Ferdinands (Chair), University of Sydney, Australia
Young-Hoo Kwon, Texas Woman’s University, USA
Joseph Hamill, University of Massachusetts-Amherst, USA
Richard Smith, University of Sydney, Australia
Dustin A. Hatfield and Gerald L. Scheirman, Motion Analysis Corporation, USA

Time and Room: Wednesday, 2:00 to 4:45, Charcoal Room, University Center

Thematic Session on Paralympic Sports will provide a new method of presenting original research at the ISBS meeting. Authors will make a brief five minute oral presentation of a poster that will be available for viewing before and after the presentation. Time for group discussion will also be provided for.

Wolfgang Potthast (Chair), German Sport University, Cologne, Germany

Time and Room: Tuesday, 14:00 to 15:30, Pioneer Room, University Center
Feedback to Athletes is an integral component in improving athletic performance. The types of feedback are as varied as the sport. A major limitation in providing feedback is that it be available to the athlete as quickly as possible, and ideally in real time. The presenters in this session will provide considerations and suggestions of how to do this in various sporting situations.

Kevin Ball (Chair), Victoria University, Australia
Ross Anderson, University of Limerick, Ireland
Ross Sanders, University of Edinburgh, UK
John Baker, Australian Institute of Sport, Australia

Time and Room: Thursday, 9:45 to 12:00,
Charcoal Room University Center

Writing and Reviewing in Biomechanics serves to make research in the discipline available to other researchers as well as athletes and other practitioners. This session will outline the fundamental writing principles for the manuscripts to be submitted to Sports Biomechanics and how to respond to the reviewers' comments after a review. General and section-specific writing guidelines will be presented along with recommendations for the preparation of the point-by-point responses to reviewers' comments.

Young-Hoo Kwon (Chair), Texas Woman’s University, USA

Time and Room: Friday, 9:45 to 10:45,
Great Lakes Rooms, University Center

In Gymnastics, the Coaching-Biomechanics Interface and Injury and Biological Loading are two interrelated themes that underpin the understanding and knowledge needed to provide a safe and effective environment for the development of gymnastics skills and for the well being of performers. The four presentations will use examples from evidenced based research on these themes.

Gareth Irwin (Chair), Cardiff School of Sport, University of Wales Institute, UK
Michael J. Hiley, Loughborough University, UK
Marianne Gittoes, Cardiff School of Sport, University of Wales Institute, UK
Gert Peter Brüggemann, German Sport University-Cologne, Germany

Time and Room: Friday, 9:45 to 12:00,
Charcoal Room, University Center
SOCIAL EVENTS

Please remember your ticket when attending any of the events listed below; these were distributed with your conference pack during registration.

SOCIAL PROGRAM
Welcome Reception:
Monday
18:30-23:00

The welcome reception will be held in the University Center on Monday 19 July. Following a welcome to Northern Michigan University (NMU) and Marquette, you will be treated to a performance of the Lake Superior Theatre Company’s music and songs of the Upper Peninsula. The opening keynote lecture will be followed by a buffet reception in the Peter White Lounge.

Adventure Activity Afternoon:
Tuesday
16:00-18:30

Conference attendees will be able to experience the great outdoors of the Upper Peninsula during Tuesday afternoon. Different options for hiking will allow you to enjoy the Northwoods with views of Lake Superior. Kayaking will allow you to see the lake from a different perspective as you go out in the water near Presque Isle, Marquette’s picturesque park. Canoeing down the Autrain River will take you into the woods and be followed by time to walk on the beach of Lake Superior. Spend time rock climbing on the 135 m² wall at the NMU recreation facility with onsite belayers. Take a tour of an open pit iron mine and see how the ore is moved with massive trucks (3.5 m high tires) to where it is processed. Appropriate attire is recommended. You will get wet canoeing and kayaking, need sturdy shoes for hiking, and no open toed shoes (sandals or flipflops) will be allowed on the mine tour.

Pasty picnic and Sunset Cruise of the Pictured Rocks National Lakeshore:
Thursday
16:00-22:00

We will have a pasty picnic on the shores of Lake Superior at Marquette’s Presque Isle Park. Pasties are known as “U.P. fast food” and a traditional meal for miners in the past. You can see what our pasties are like at www.jeankayspasties.com. There will also be ice cream cones with locally made Jilbert’s ice cream, a local favorite. After the picnic, we will travel by bus (70 km) to Munising a sunset cruise of the Pictured Rocks National Lakeshore, with breathtaking views of sandstone cliffs, waterfalls, lush forest, and shoreline of Lake Superior. We will return to Marquette at about 23:00 and you will be dropped off at your hotel or campus lodging.

Gala Dinner:
Friday
19:30-midnight

The gala dinner will be held at the downtown Marquette restaurant/nightclub UpFront and Company. Shuttle transportation will be provided departing from Magers/Meyland Hall at 19:00. Please bring your ticket with you.

Partner Social and Tour Programs
(Guests who have been pre-registered are also invited to participate in all of the above activities.)
Get acquainted with the city on a tour of Marquette:
Tuesday
09:00 – 12:00

Get to know Marquette on an informal guided tour departing from campus. You’ll see the city’s lakeshore, beautiful Presque Isle Park, our shopping and restaurant districts and key points of interest, including local museums. We’ll include plenty of time to get out and take photos, explore and shop downtown and stop for ice cream at Jilbert’s Dairy Barn. Participants will be given shopping and dining guides, a Marquette map and special coupons for downtown businesses.
GENERAL INFORMATION

Climate
The Upper Peninsula of Michigan has a temperate climate resulting in relatively cool summers. The mean daily temperature in July is 15-20 degrees Celsius. It is generally quite dry in July but it is possible to experience many climate changes in one day. Rain can occur at any time, so come prepared!

Electricity Supply
The United States works off a flat two-pin plug system. Electrical current is 110 volts, 60 cycles alternating current (AC). You are advised to purchase the appropriate adapters in advance. These are available at most large airports.

Credit Cards
Credit cards are widely used in Michigan and all leading credit cards are accepted. Please consult your own bank. Accepted credit cards for conference fees include Visa, Mastercard, and Discover; American Express is not accepted by NMU.

Clothing
The Upper Peninsula is generally informal about clothes. Warm sweaters, comfortable walking shoes and rainwear are advisable throughout the year.

Shopping
Shops are generally open Monday to Saturday from 9:00 to 18:00 with late night shopping until 20:00 or 21:00 at many of the larger stores. On Sunday, many supermarkets and some of the bigger shops will open from midday until 21:00. There is a small store near Magers/Meyland Hall and a full-size grocery store is within walking distance of campus.

Driving
A valid license is required for driving in the United States. Driving is on the right side of the road and seat belts must be worn at all times. In Michigan, the speed limits are 25 mph in built-up areas, 55 mph on rural roads. The signposts denoting speed and distance are in miles per hour.

Smoking Ban
Since 1 May, 2010, the Michigan government has implemented a wide reaching ban on smoking. This means that smoking is forbidden in enclosed places of work in Michigan. This includes office blocks, public/state buildings (including universities), public houses/bars, restaurants, shops and stores.

Alcoholic Beverages
The legal drinking age in Michigan is 21. When buying alcohol the seller will request photo identification to verify that the buyer is over 21. The inability to provide this identification will result in refusal of service. In addition, alcohol is not allowed on the Northern Michigan University campus unless at official university functions. The “ISBS 2010 Pub” is considered part of a university function.

Currency
The dollar is the local currency of the United States. One dollar consists of 100 cents. Notes are $1, $5, $10, $20, $50 and $100. Coins are 50 cents, 25c, 10c, 5c, and 1c.

Emergency Numbers
For emergency police, fire, ambulance, telephone 911. This number is free of charge but should be used only in cases of genuine emergency. On answer, state which service you require, wait to be connected to that service, and then clearly state the location of where the assistance is required.
1. The University Center
2. Magers and Meyland Hall lodging
3. Superior Dome and adjoining PEIF recreational facility
4. University library (Lydia Olson Library/Learning Resources Center)
MARQUETTE MAP

PICTURED ROCKS NATIONAL LAKESHORE
## CONFERENCE SCHEDULE

### Monday, 19 July

<table>
<thead>
<tr>
<th>Time</th>
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| **09.00 - 10.00** | **Keynote**: Jackie Hudson: *BIOMECHANICS DONE BACKWARDS*.  
(Session Chair: Scott Strohmeyer) //Michigan Room |
| **10.15 - 11.15** | Darla Smith, Manfred Vieten, and Mark Walsh: *Panel Discussion of Online teaching*  
(Session Chair: Michael Bird) //Michigan Room |
| **11.30 - 12.30** | Peter McGinnis: *Novel teaching techniques*  
(Session Chair: Erin Learoyd) //Michigan Room |
| **12.30 - 14.00** | Lunch                                                                                      |
| **14.00 - 15.00** | Round tables:  
- *Strategies for Teaching Students with Learning Disabilities* [Moderator: Kathryn Ludwig]  
- *Possible Pedagogical Use of Social Networking* [Moderator: Jennifer Bridges]  
- *Meaningful Assessment* [Moderator: Miriam Satern]  
- *Syllabi Design and Course Content* [Moderator: Darla Smith]  
- *Approaches to Teaching Biomechanics* [Moderator: Jake Streepy] |
| **15.15 - 16.15** | Debra Allyn and Pamela Russell: *Capstone Experiences*  
(Session Chair: Saori Hanaki-Martin) // Michigan Room |
| **16.15 - 18.30** | Free time                                                                                   |
| **16.30 - 18.15** | Preconference ISBS Board of Directors Meeting                                               |
| **18.30 - 23:00** | **Opening Ceremony of ISBS 2010 Congress**                                                   |
| **19.00 - 20.00** | **Opening Lecture (at Ceremony)**: Karen Roemer: *BIOMECHANICAL MODELING APPLIED TO HUMAN MOVEMENT ANALYSIS*.  
(Session Chair: Young Tae Lim) //Michigan Room |
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<tr>
<th>Time</th>
<th>Event</th>
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<tr>
<td>08.30 -</td>
<td><strong>Geoffrey Dyson Lecture</strong> - Barry Bates: <em>ACCOMMODATING STRATEGIES FOR PREVENTING CHRONIC LOWER EXTREMITY INJURIES</em></td>
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<td>09.30</td>
<td>[Session Chair: Joseph Hamill] //Michigan Room</td>
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<td>09.45 -</td>
<td><strong>Poster Session 1 &amp; Coffee Break</strong> // Exhibit Hall</td>
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<td>10.45</td>
<td><strong>Applied Session 1 Nordic Skiing Mechanics and Physiology</strong> //Charcoal Room</td>
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<td>10.45 -</td>
<td><strong>Oral Session 1 Jumping 1</strong> [Session Chair: Hans Joachim Menzel] //</td>
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<td>12.00</td>
<td>Michigan Room</td>
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<td>10.45 –</td>
<td><strong>Oral Session 2 Weightlifting</strong> [Session Chair: Angus Burnett] //</td>
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<td>11.00</td>
<td>Huron Room</td>
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<td>10.45 –</td>
<td><strong>VALIDATION OF ACCELEROMETER DATA FOR MEASURING IMPACTS DURING JUMPING AND</strong></td>
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<td>11.00</td>
<td><strong>LANDING TASKS. Jacqueline Tran, Paul Gastin, Kevin Netto and Brad Aisbett</strong></td>
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<td>11.00 –</td>
<td><strong>RELATIONSHIP OF GROUND AND KNEE JOINT REACTION FORCES IN PLYOMETRIC EXERCISES.</strong></td>
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<td>11.15</td>
<td><strong>Sarah K. Leissring, Erich J. Petushek, Mitchell L. Stephenson, Randall L. Jensen</strong></td>
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<td>11.15 –</td>
<td><strong>THE EFFECTS OF ACUTE WHOLE-BODY VIBRATION ON MAXIMAL COUNTERMOVEMENT VERTICAL JUMP IN RECREATIONALLY ACTIVE MALES AND FEMALES.</strong></td>
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<td>11.30</td>
<td><strong>Sarah Hilgers and Bryan Christensen</strong></td>
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<td>11.30 –</td>
<td><strong>BCH ANGLES OF YOUNG FEMALE WEIGHTLIFTERS DURING SNATCH MOVEMENT. Hung Ta Chiu and Jih Lei Liang</strong></td>
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<td>11.45</td>
<td><strong>Free time</strong></td>
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<td>12.00</td>
<td><strong>Lunch</strong></td>
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<td>13.00 -</td>
<td><strong>Keynote: Justin W.L. Keogh: <em>PARALYMPIC SPORTS, THE NEXT FRONTIER FOR SPORTS SCIENCE.</em></strong></td>
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<tr>
<td>14.00</td>
<td>[Session Chair: G. Wayne Marino] //Michigan Room</td>
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<td>14.00 -</td>
<td><strong>Thematic Session Paralympics</strong> [Session Chair: Wolfgang Potthast &amp; Peter Brüggemann] //Pioneer A</td>
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<td>15.30</td>
<td><strong>Oral Session 3 Modeling</strong> [Session Chair: Marianne Gittoes] //Michigan Room</td>
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<td>14.00 – 14.15</td>
<td>A COMPUTATIONAL MODEL TO INVESTIGATE SHOE AND SHOE-SURFACE INTERFACE EFFECTS ON ANKLE LIGAMENT STRAINS DURING A SIMULATED SIDESTEP CUTTING TASK. Feng Wei, John W. Powell, Roger C. Haut</td>
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<tr>
<td>14.15 – 14.30</td>
<td>JUMP KINETICS, BONE HEALTH AND NUTRITION IN ELITE ADOLESCENT FEMALE ATHLETES. Mark Moresi, Elizabeth Bradshaw, David Greene, Geraldine Naughton</td>
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<tr>
<td>14.30 – 14.45</td>
<td>A NEW METHOD FOR UNCONSTRAINED MEASUREMENT OF KNEE JOINT ANGLE AND TIMING IN ALPINE SKIING: COMPARISON OF CROSSOVER AND CROSSUNDER TURNS. Julien Chardonnens, Julien Favre, Gérald Gremion, Kamiar Aminian</td>
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<tr>
<td>15.00 – 15.15</td>
<td>CREATION OF THEORETICAL DATA SETS TO EXAMINE MOVEMENT VARIABILITY USING MODELLING. Ross Anderson, Ian C. Kenny, Catherine Tucker, Joseph O’Halloran</td>
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<tr>
<td>15.15 – 15.30</td>
<td>ANTAGONIST CONDITIONING CONTRACTIONS IMPAIR AGONIST FUNCTIONING. Luke R. Garceau, Aaron Gray, McKenzie L. Fauth, Phillip Hanson, Brittni Hsu, Tejin Yoon, Chris Szalkowski, Brittney Lutsch, William P. Ebben</td>
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<tr>
<td>15.30 – 15.45</td>
<td>METHOD TO VISUALIZE AND ANALYZE SIMILARITIES OF MOVEMENTS – USING THE EXAMPLE OF KARATE KICKS. Kerstin Witte, Peter Emmermacher, Nico Langenbeck</td>
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<tr>
<td>15.45 – 16.00</td>
<td>ACTIVATION AND CONTRIBUTION OF TRUNK AND LEG MUSCULATURE TO FORCE PRODUCTION DURING ON-WATER SPRINT KAYAK PERFORMANCE. Mathew B. Brown, Mike Lauder, Rosemary Dyson</td>
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<tr>
<td>16.00 – 16.15</td>
<td>THE EFFECT OF MYOELECTRIC STIMULATION ON PERONEAL MUSCLES TO RESIST SUDDEN SIMULATED ANKLE SPRAIN MOTIONS. Daniel Tik-Pui Fong, Vikki Wing-Shan Chu, Mandy Man-Ling Chung, Yue-Yan Chan, Patrick Shu-Hang Yung, Kai-Ming Chan</td>
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<td>15.00 – 15.15</td>
<td>Free time</td>
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<td>15.15 – 16.00</td>
<td>Adventure Activities</td>
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## Wednesday 21 July

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<tbody>
<tr>
<td>08.30 - 09.30</td>
<td><strong>Keynote:</strong> Andrew J. Harrison: BIOMECHANICAL FACTORS IN SPRINT TRAINING—WHERE SCIENCE MEETS COACHING. [Session Chair: Cassie Wilson] // Michigan Room</td>
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<tr>
<td>09.45 - 10.45</td>
<td><strong>Poster Session 2 &amp; Coffee Break</strong> // Exhibit Hall</td>
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<td>10.45 - 12.00</td>
<td><strong>Applied Session Olympic Weightlifting</strong> // Superior Dome</td>
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<td><strong>Oral Session 5 NIA Other</strong> [Session Chair: Hermann Schwameder] // Michigan Room</td>
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<td><strong>Oral Session 6 Cycling</strong> [Session Chair: Jennifer Bridges] // Huron Room</td>
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<td>10.45 – 11.00</td>
<td>PROJECTED LIGHT SYSTEM FOR TRUNK SURFACE RECONSTRUCTION AND VOLUME MEASUREMENT DURING RESPIRATION. Angelica Lodovico, Pietro Cerveri, Giancarlo Ferrigno, Ricardo M. L. Barros</td>
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<td>JOINT-SPECIFIC POWER PRODUCTION DURING SUBMAXIMAL AND MAXIMAL CYCLING. Steven Elmer, Paul Barratt, Tom Korff, James Martin</td>
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<td>11.00 – 11.15</td>
<td>TRANSMISSION OF VIBRATION ABOUT THE KNEE. Trentham Furness, Corey Joseph, Bianca Share, Geraldine Naughton, Wayne Maschette, Christian Lorenzen</td>
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<td>THE INFLUENCE OF WORK RATE AND CADENCE ON MOVEMENT COORDINATION IN CYCLING. Cassie Wilson, Deborah Sides</td>
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<td>11.15 – 11.30</td>
<td>ULTRASONIC MONITORING FOR THE EVALUATION OF CONDITIONING BY TRAINING SESSION FOR ATHLETES. M. Zakir Hossain, Wolfgang Grill</td>
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<td>A COMPARISON OF PEDALING MECHANICS IN EXPERIENCED POSE AND TRADITIONAL CYCLISTS. Graham Fletcher, Tom Korff, Lee Romer, Dave Brown, Nicholas Romanov</td>
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<td>11.30 – 11.45</td>
<td>BALANCE TRAINING ALTERS POSTURAL DYNAMICS UNIQUELY FOR STANCE ON COMPLIANT VS. NON-COMPLIANT SURFACES. Brittany Caserta, Adam Strang, Mathias Hieronymus, Josh Haworth, Mark Walsh</td>
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<td>FORWARD SEAT POSITION EFFECTS ON CYCLING KINEMATICS. Saori Hanaki-Martin, David R. Mullinaeux, Kyoungkyu Jeon, Robert Shapiro</td>
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<td>11.45 – 12.00</td>
<td>QUANTITATIVE ANALYSIS OF CORE MUSCULATURE DURING TWO TYPES OF BASEBALL PITCHES: FASTBALL AND CHANGE-UP. Gretchen D. Oliver, Masamichi Abe, David Keeley</td>
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<td>12.00 – 13.00</td>
<td><strong>Lunch</strong></td>
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<td>13.00 - 14.00</td>
<td><strong>Keynote:</strong> Thorsten Sterzing: KICKING IN SOCCER. [Session Chair: Kevin Ball] // Michigan Room</td>
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<th>14.00 - 15.30</th>
<th><strong>Applied Session Motion Analysis</strong> // Charcoal Room</th>
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<td><strong>Oral Session 7 Sprinting</strong></td>
<td>[Session Chair: Ian Bezodis] // Michigan Room</td>
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<td>14.00 – 14.15</td>
<td>FOOT PLANTING TECHNIQUES WHEN SPRINTING AT CURVES. Oleg Nemtsev, Andrei Chechin</td>
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<td>14.15 – 14.30</td>
<td>KINEMATIC ASPECTS OF BLOCK PHASE TECHNIQUE IN SPRINTING. Neil E. Bezodis, Aki I.T. Salo, Grant Trewartha</td>
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<td>14.45 – 15.00</td>
<td>PERFORMANCE DETERMINING FACTORS IN ELITE SPRINTERS DURING SPRINT START AND TWO FOLLOWING SUCCESSIVE SUPPORTS. Sofie Debaere, Ilse Jonkers, Dirk Aerenhouts, Friso Hagman, Bart Van Gheluwe, Christophe Delecuse</td>
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<td>15.00 – 15.15</td>
<td>CHANGES IN SPLIT VELOCITIES DURING SPRINT PERFORMANCE DEVELOPMENT. Laura Charalambous, David G. Kerwin, Gareth Irwin, Ian N. Bezodis</td>
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<td>15.15 Free time</td>
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<td>15.30 – 16.45</td>
<td><strong>Applied Session Motion Analysis</strong> // Charcoal Room</td>
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<td><strong>Oral Session 9 NIA Running</strong></td>
<td>[Session Chair: Thorsten Sterzing] // Michigan Room</td>
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<tr>
<td><strong>Oral Session 10 Soccer &amp; Tennis</strong></td>
<td>[Session Chair: Rafael Bahamonde] // Huron Room</td>
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<td>15.30 – 15.45</td>
<td>TRAINING FOR THE BIKE TO RUN TRANSITION IN TRIATHLON. Josh Haworth, Mark Walsh, Adam Strang, Jeff Hohl, Sarah Spraets, Michelle Wilson, Cory Brown</td>
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<td>15.45 – 16.00</td>
<td>EFFECT OF RESPIRATION DYNAMICS ON POSTURAL CONTROL FOLLOWING A 5K RUN. Erin Harper, Adam Strang, Mark Walsh, Brittany Caserta, Joshua Haworth, Mathias Hieronymus</td>
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<td>15.45 – 16.00</td>
<td>‘BEND IT LIKE BECKHAM’: BALL ROTATION IN THE CURVED FOOTBALL KICK. David Whiteside, Jacqueline Alderson and Bruce Elliott</td>
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<td>15.45 – 16.00</td>
<td>TASK DECOMPOSITION AND THE HIGH PERFORMANCE JUNIOR TENNIS SERVE. Machar Reid, Bruce Elliott, David Whiteside</td>
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<td>16.00 – 16.15</td>
<td>THE INTER-DAY RELIABILITY OF A METHOD USED TO DETERMINE VERTICAL, KNEE AND ANKLE STIFFNESS DURING RUNNING.</td>
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<td>16.15 – 16.30</td>
<td>THE TRUNK ORIENTATION DURING SPRINT START ESTIMATED USING A SINGLE INERTIAL SENSOR.</td>
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<td>16.30 – 16.45</td>
<td>TOWARDS AN AUTOMATED FEEDBACK COACHING SUPPORT SYSTEM FOR SPRINT PERFORMANCE MONITORING.</td>
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<td>16.45 - 18.00</td>
<td><strong>Oral Session 11 Balance</strong> [Session Chair: Kerstin Witte] // Michigan Room</td>
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<td>16.45 – 17.00</td>
<td>A CASE STUDY ON BALANCE RECOVERY IN SLACKLINING.</td>
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<td>Philipp Huber, Reinhard Kleindl</td>
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<td>17.00 – 17.15</td>
<td>EFFECT OF COMBINED LOCAL TOPICAL ANESTHESIA AND PHYSICAL ACTIVITY ON KNEE PROPRIOCEPTION SENSES, AND STATIC BALANCE IN HEALTHY YOUNG INDIVIDUALS.</td>
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<td>17.15 – 17.30</td>
<td>THE EFFECT OF KOREAN FOLK DANCE EXERCISE TO THE KINEMATIC PARAMETERS FOR DOWN STAIRCASE WALKING OF ELDERLY PEOPLE.</td>
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<td>17.30 – 17.45</td>
<td>BIOMECHANICAL ANALYSIS OF TAI CHI CHUAN FIXED-STEP PUSH-HAND.</td>
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<td>Yao-Ting Chang, Jia-Hao Chang</td>
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<td>17.45 – 18.00</td>
<td>AN ARTIFICIAL NEURAL NETWORK METHOD FOR PREDICTING LOWER LIMB JOINT MOMENTS FROM KINEMATIC PARAMETERS DURING COUNTER-MOVEMENT JUMP.</td>
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<td>Session/Activity</td>
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<td>08.30 -</td>
<td><strong>Keynote</strong>: Glenn Fleisig: <em>BIOMECHANICS OF BASEBALL PITCHING: IMPLICATIONS FOR INJURY AND PERFORMANCE.</em> [Session Chair: Edouard Rene Ferdinands] // Michigan Room</td>
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<tr>
<td>09.45 -</td>
<td><strong>Poster Session 3 &amp; Coffee Break</strong> // Exhibit Hall</td>
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<tr>
<td>10.45 -</td>
<td><strong>Applied Session Feedback to Athletes</strong> // Charcoal Room</td>
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<tr>
<td>10.45 – 11.00</td>
<td><strong>Oral Session 13 Throwing</strong> [Session Chair: Bing Yu] // Michigan Room</td>
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<tr>
<td>10.45 – 11.00</td>
<td>Individualized Optimal Release Angle in Discus Throwing. Bing Yu, Steve Leigh, Hui Liu</td>
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<tr>
<td>11.00 – 11.15</td>
<td><strong>Oral Session 14 Walking and Running on a Treadmill</strong> [Session Chair: Jing Xian Li] // Huron Room</td>
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<td>11.00 – 11.15</td>
<td>The Influence of Manually Adjusting the Running Speed on the Impact Acceleration of the Tibia during Treadmill Running. I Shan Tsai, Hung Ta Chiu</td>
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<tr>
<td>11.00 – 11.15</td>
<td>Effects of Movement Sequence on the Performance of Javelin Throwing. Hui Liu, Steve Leigh, Bing Yu</td>
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<td>11.15 – 11.30</td>
<td><strong>Oral Session 15 Running/Walking</strong> [Session Chair: Ezio Preatoni] // Michigan Room</td>
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<td>11.15 – 11.30</td>
<td>Associations Between Javelin Throwing Technique and Release Speed. Steve Leigh, Hui Liu, Bing Yu</td>
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<td>11.15 – 11.30</td>
<td>Reliability of 3D Frontal Plane Knee Ab/Adduction Range of Motion during Running in Young Athletes. Kelly Sheerin, Chris Whatman, Patria Hume, James Croft</td>
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<td>11.30 – 11.45</td>
<td><strong>Oral Session 16 Training</strong> [Session Chair: Justin Keogh] // Huron Room</td>
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<tr>
<td>11.30 – 11.45</td>
<td>Associations Between Javelin Throwing Technique and Aerodynamic Distance. Steve Leigh, Hui Liu, Bing Yu</td>
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<td>11.30 – 11.45</td>
<td>Changes in Step Length and Width during Treadmill Running. Yen Tzu Huang, Kuangyou Bruce Cheng</td>
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<td>11.45 – 12.00</td>
<td><strong>Oral Session 17 Individualization of Optimal Release Angle in Discus Throwing</strong></td>
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<td>11.45 – 12.00</td>
<td>Coming Down: Throwing Mechanics of Baseball Catchers. Dave Fortenbaugh, Glenn Fleisig, Becky Bolt</td>
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<td>11.45 – 12.00</td>
<td>Identification of EMG Frequency Patterns in Running by Wavelet Analysis and Support Vector Machines. Thomas Jaitner, Daniel Janssen, Ronald Burger, Uwe Wenzel</td>
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<tr>
<td>12.00 – 13.00</td>
<td><strong>Lunch</strong></td>
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<td>13.00 – 14.00</td>
<td><strong>Oral Session 18 Training</strong> [Session Chair: Justin Keogh] // Huron Room</td>
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<td>13.00 – 13.15</td>
<td>Change in Footstrike Position is Related to Alterations in Running Economy in Triathletes. Jason Bonacci, Daniel Green, Philo U. Saunders, Peter Blanch, Melinda Franetovich, Andrew R. Chapman, Bill Vicenzino</td>
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<td>13.15 – 13.30</td>
<td>ANALYSIS OF THE BACKPACK LOADING EFFECTS ON THE HUMAN GAIT. Leandro Machado; Marcelo P. de Castro; Sofia Abreu; Helena Sousa; Pedro Gonçalves; Filipa Sousa; Rubim Santos; Viviana Pinto; Mário Vaz; J. Paulo Vilas-Boas</td>
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<tr>
<td>13.45 – 14.00</td>
<td>EFFECTS OF BACKWARD WALKING AS A MODALITY FOR LOW BACK PAIN REDUCTION IN ATHLETES. Janet Dufek, Anthony House, Brent Mangus, John Mercer, Geoffrey Melcher</td>
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<tr>
<td>14.00 – 14.15</td>
<td>TECHNIQUES TO START THE STOOP CIRCLE (ADLER) ON HIGH BAR. Falk Naundorf, Thomas Lehmann, Kerstin Witte</td>
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<td>14.30 – 14.45</td>
<td>KINEMATIC CHANGES DURING LEARNING THE LONGSWING ON HIGH BAR. Genevieve Williams, Gareth Irwin, David G. Kerwin</td>
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<td>14.45 – 15.00</td>
<td>LEVELS OF MUSCLE ACTIVATION IN STRENGTH AND CONDITIONING EXERCISES AND DYNAMOMETER HIKING IN JUNIOR SAILORS. Wing Kuen Wee, Angus Burnett, Wei Xie</td>
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<tr>
<td>15.00 – 16.00</td>
<td>Free time</td>
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<tr>
<td>16:00 – 22:00</td>
<td>Picnic &amp; Boat Cruise</td>
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</table>
### Keynote: Elizabeth Bradshaw: "PERFORMANCE AND HEALTH CONCEPTS IN ARTISTIC GYMNASTICS"

(Session Chair: Gareth Irwin) // Michigan Room

### Applied Session: Young Hoo Kwon: "WRITING AND REVIEWING MANUSCRIPTS"

(Session Chair: Ross Sanders) // Michigan Room

**Poster Session 4 & Coffee Break** // Exhibit Hall

### Applied Session Gymnastics // Charcoal Room

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<td>10.45 – 11.00</td>
<td>EXCESSIVE TIBIAL ROTATION IS RESTORED AFTER ANATOMICAL DOUBLE BUNDLE ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION. Mak-Ham Lam, Daniel Tik-Pui Fong, Patrick Shu-Hang Yung, Eric Po-Yan Ho, Kwai-Yau Fung, Kai-Ming Chan</td>
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<tr>
<td>11.00 – 11.15</td>
<td>PREDICTION OF ANKLE JOINT TORQUES USING ARTIFICIAL NEURAL NETWORKS. Kaitlyn Kopke, Jerrod Braman, Charles Bardel, Tariq Khan, John Powell, Lalita Udpa, Roger Haut</td>
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<td>11.15 – 11.30</td>
<td>LUMBAR KINEMATICS AND KINETICS OF YOUNG AUSTRALIAN FAST BOWLERS. René E.D. Ferdinands, Max Stuelcken, Andy Greene, Peter Sinclair, Richard Smith</td>
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<td>11.30 – 11.45</td>
<td>THE APPLICATION OF A SPORT-SPECIFIC 3D STEREOSCOPIC STIMULUS TO EXAMINE PRE-PLANNING TIME AND GAZE CHARACTERISTICS DURING EVASIVE SIDE-STEPPING MANOEUVRES. Jacqueline Alderson, Marcus Lee, Paul Bourke, Brendan Lay, David Lloyd, Bruce Elliott</td>
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<tr>
<td>11.45 – 12.00</td>
<td>AMATEUR BOXER BIOMECHANICS AND PUNCH FORCE. Jacob Mack, Sarah Stojsih, Don Sherman, Nathan Dau, Cynthia Bir</td>
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### Oral Session 19 Sports Injury

(Session Chair: Daniel T.P. Fong) // Michigan Room

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<tr>
<td>11.00 – 11.15</td>
<td>KICK IMPACT CHARACTERISTICS FOR DIFFERENT RUGBY LEAGUE KICKS. Kevin Ball</td>
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<td>11.15 – 11.30</td>
<td>THE SUCCESS OF A SOCCER KICK DEPENDS ON RUN UP DECELERATION. Wolfgang Potthast, Kai Heinrich, Johannes Schneider, Gert-Peter Brueggemann</td>
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<td>11.30 – 11.45</td>
<td>COORDINATION PATTERNS OF PREFERRED AND NON-PREFERRED KICKING OF THE DROP PUNT KICK: A KINEMATIC ANALYSIS OF THE PELVIS, HIP AND KNEE. Jamie Falloon, Kevin Ball, Clare MacMahon, Simon Taylor</td>
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### Annual General Meeting: Manfred Vieten, President of ISBS // Michigan Room

### Lunch

### Youngblood Keynote: Ezio Preatoni: "MOTOR VARIABILITY AND SKILLS MONITORING IN SPORTS."

(Session Chair: Elizabeth Bradshaw) // Michigan Room
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<tr>
<td>15:00 – 15:30</td>
<td><strong>New Investigator Award Finalists</strong> [Session Chair: Elizabeth Bradshaw] // Michigan Room</td>
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<tr>
<td>15:30 – 18:30</td>
<td>Post-conference Board of Directors Meeting</td>
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<td>19:30 – 24:00</td>
<td><strong>Closing Banquet</strong></td>
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## POSTER SESSIONS

**Poster Session PS1 – Tuesday (9:45 – 10:45)**

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<th>PS1</th>
<th>1</th>
<th>INTRA-RATER AND INTER-RATER RELIABILITY OF A MODEL-BASED IMAGE-MATCHING MOTION ANALYSIS TECHNIQUE IN MEASURING ANKLE JOINT KINEMATICS - Aaron See-Long Hung, Kam-Ming Mok, Daniel Tik-Pui Fong, Tron Krosshaug, Kai-Ming Chan</th>
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<tr>
<td>PS1</td>
<td>2</td>
<td>UNDERWATER NON-LINEAR CAMERA CALIBRATION: AN ACCURACY ANALYSIS - Amanda P. Silvatti, Thiago Telles, Marcel M. Rossi, Fábio A. S. Dias, Neucimar J. Leite, Ricardo M. L. Barros</td>
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<tr>
<td>PS1</td>
<td>3</td>
<td>GROUND REACTION FORCE AND RATE OF FORCE DEVELOPMENT DURING LOWER BODY RESISTANCE TRAINING EXERCISES - Brad J. Wurm, Luke R. Garceau, Tyler L. Vander Zanden, McKenzie L. Fauth, William P. Ebben</td>
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<tr>
<td>PS1</td>
<td>5</td>
<td>QUANTIFYING sEMG IN PRE-FATIGUE AND FATIGUE STATES DURING THE FASTBALL BASEBALL PITCH - Gretchen D. Oliver, Hillary Plummer</td>
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<tr>
<td>PS1</td>
<td>6</td>
<td>KINEMATIC ANALYSIS OF LOWER LIMB IN FUTSAL BALL KICKING - Hiroki OZAKI, Shunske SUNAMI, Hideyuki ISHII</td>
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