American Society of Biomechanics

34th Annual Meeting

Providence, RI
August 18–21, 2010

BROWN

Rhode Island Hospital
A Lifespan Partner

NIBIB

NIAMS
National Institute of Arthritis and Musculoskeletal and Skin Diseases

RIH Orthopaedic Foundation, Inc.
an
test facility


AMTI
FORCE AND MOTION


ATI
INDUSTRIAL AUTOMATION
www.ati-ia.com


BERTEC


DELSYS


INSTRON


KISTLER
measure. analyze. innovate.


MotionAnalysis


MOTEK
MEDICAL


NDI
Northern Digital Inc.
RESEARCH-GRADE MOTION CAPTURE


NORAXON
EMG & Sensor Systems


POLHEMUS
INNOVATION IN MOTION


QUALISYS
Motion Capture Systems


C-Motion


Tekscan


ViSiON
RESEARCH
An AMETEK Company


SIMULIA


CORTECH
SOLUTIONS


The
Motion Monitor
...The Total Solution in Motion Capture


MTS


novel


VICON


Xcitex


BIOMOMENTUM


PTI
Phoenix Technologies
3D real-time active optical mocap systems


Mixed So
FSC

HOW TO USE THIS PROGRAM:
- Use the links in the Table of Contents to view each Program Section
- Use the provided Bookmarks to view each ABSTRACT

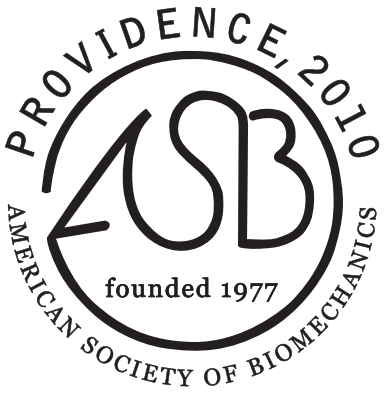


Table of Contents

Welcome 2
The Meeting and Program Committees 3
ASB Executive Committee 3
Meeting Information at a Glance 4
Networking and Professional Development 5
Social Program 5
Instructions for Presenters 6
Tutorials 6
Lab Tours 7
Plenary and Awards Sessions 7
Symposia 10
Podium Sessions 12
Poster Sessions 19
Convention Center Floor Plan 40
Providence/Conference Map ..... Inside Back Cover
Conference Schedule ..... Back Cover

Wednesday, August 18

Time	Hall C	Hall E
12:30–2:00	Tutorial 1 Grant Writing for NIH	Tutorial 2 X-ray Recon. of Moving Morphology
2:00–3:15	Lab Tour 1 Neuro-Rehab. Lab Gait and Motion Analysis	Tutorial 2 X-ray Recon. of Moving Morphology
3:15–5:00	Lab Tour 1 Neuro-Rehab. Lab Gait and Motion Analysis	Lab Tour 2 Facility for X-Ray Recon. of Movement (XROMM)

2:00–5:00: ASB Executive Board Meeting (Rm 554)

5:30–6:00: ASB Executive Board and Exhibitor Reception (RISD)

6:00–7:30: Opening Reception, Museum of Art, Rhode Island School of Design (RISD) (6:00–7:30)

Thursday, August 19

Time	Hall C	Hall A	Hall E
7:00–8:00	Breakfast	Breakfast	Past Presidents Breakfast (Rm 554)
8:00–9:15	Rehabilitation	Tissue Mechanics	Methods
9:15–9:45	Break and Exhibits	Break and Exhibits	Break and Exhibits
9:45–11:00	Neuro-Rehabilitation	Muscle	Injury
11:00–11:30	Break and Exhibits	Break and Exhibits	Break and Exhibits
11:30–12:30	Keynote Address: *George Lauder, PhD*, Harvard University		
12:30–1:45	Box Lunch and Exhibits	Box Lunch and Exhibits	Diversity Luncheon (Rm 557)
1:45–3:00	Motor Control	Knee	Bone
3:00–3:15	Break	Break	Break
3:15–4:30	Machines Inspired by Animal Locomotion	Biomech App of Biplane Fluoroscopy	
4:30–6:00	Poster Sessions (odd numbers) and Exhibits		
6:00–6:15	Break	Break	Break
6:15–7:30	Junior Faculty Mentoring Roundtable (Rm 555)	Student Mentoring Roundtable (Rm 557)	

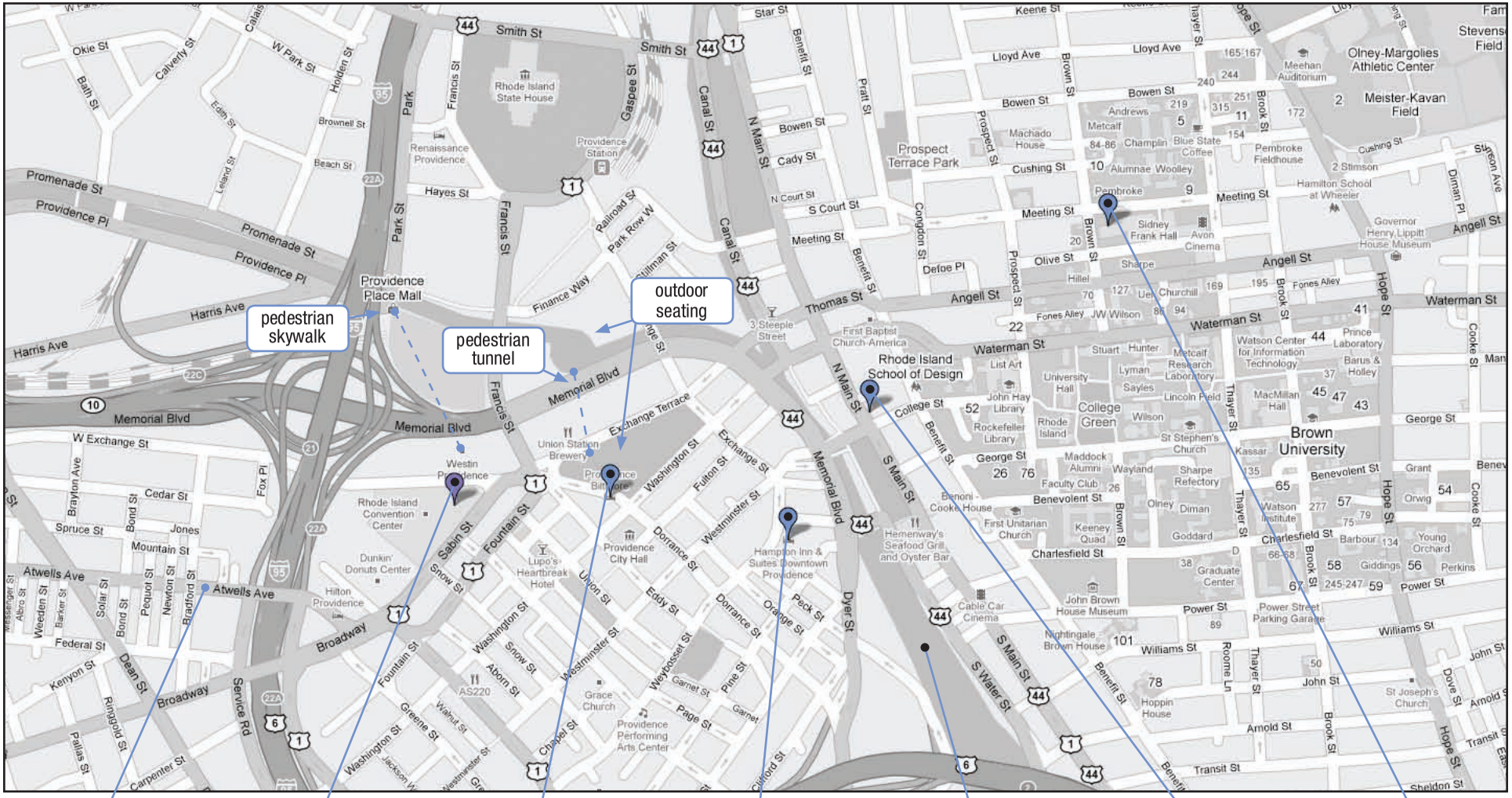
Night on the town

Friday, August 20

Time	Hall C	Hall A	Hall E
7:00–8:00	Breakfast	Breakfast	Women in Science Breakfast (Rm 557)
8:00–9:15	Orthopaedics	Neuro-mechanics	Gait
9:15–9:45	Break and Exhibits	Break and Exhibits	Break and Exhibits
9:45–11:00	Comp. Modeling	Joint Mechanics	Pathological Gait
11:00–11:30	Break and Exhibits	Break and Exhibits	Break and Exhibits
11:30–12:30	Keynote Address: *James J Collins, PhD*, Boston University		
12:30–2:00	Box Lunch and Exhibits	Box Lunch and Exhibits	ASB Business Meeting (Hall E)
2:00–3:00	Borelli Award Lecture: *Farshid Guilak, PhD*, Duke University		
3:00–3:15	Break	Break	Break
3:15–4:30	Robotic Lower Limb Orthoses and Prostheses	3D Models of Muscle-Tendon Behavior	
4:30–6:00	Poster Sessions (even numbers) and Exhibits		
6:00–7:30	Banquet: The Herreshoff Marine Museum & America's Cup Hall of Fame, Bristol, RI (6:00–10:00)		

Saturday, August 21

Time	Hall C	Hall A	Hall E
7:00–8:00	5k River Run; Breakfast (7:15–8:00)	5k River Run; Breakfast (7:15–8:00)	5k River Run
8:00–9:15	Imaging	Sports	Locomotion Energetics
9:15–9:30	Break	Break	Break
9:30–10:45	Upper Extremity	Award Finalists J Biomed Clin Biomech	Posture & Balance
10:45–11:00	Break	Break	Break
11:00–11:30	Young Scientist Predoctoral Award; Young Scientist Postdoctoral Award		
11:30–12:15	James J. Hay Memorial Lecture: *Darren Stefanyshyn, PhD*, University of Calgary		
12:15–12:45	Closing Ceremony and Awards		
12:45–2:00	ASB Executive Board Meeting (Rm 554)		



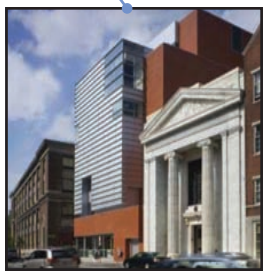
Federal Hill on Atwells Ave

ASB 2010 Meeting Venue Rhode Island Convention Center

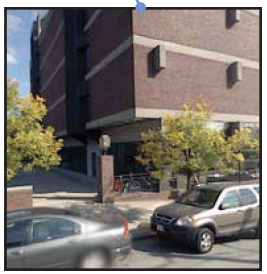
Providence Biltmore Hotel

Hampton Inn & Suites

Downtown Providence from Providence River



Opening Reception RISD Art Museum



Tour 2: XROMM Facility and Comparitative Biomechanics at BioMed Center

PROVIDENCE RESTAURANTS
2010 American Society of Biomechanics
August 18-21, 2010

COFFEE

- **Starbucks (in Biltmore Hotel)**
  11 Dorrance St. (401) 490-4495
- **Dunkin' Donuts (1 block from Convention Center)**
  66 Fountain St. (401) 521-6913
- **Tazza Caffe (also serves food and alcohol; 3 blocks from Convention Center)**
  250 Westminster St. (401) 421-3300

BREW PUBS

- **Trinity Brewhouse (2 blocks from Convention Center)**
  186 Fountain St. (401) 453-2337
- **Union Station Brewery (1 block)**
  36 Exchange Terrace (401) 274-2739
- **RiRa Irish Pub (1 block)**
  50 Exchange Terrace (401) 272-1953
- **The Wild Colonial (12 blocks; pool & darts)**
  250 South Water Street (401) 621-5644
- **Harry's Bar & Burger (4 blocks)**
  121 North Main Street (401) 228-7437

PROVIDENCE PLACE MALL (1 block from, and connected to, RI Convention Center through Westin Hotel on Third Level)

- **Food Court,** 3rd Level (burgers, pizza, Indian, Chinese, Japanese, Italian, Subway, etc.)
- **Joe's American Bar & Grill**
  Ground level (401) 270-4737
- **Fire + Ice**
  Ground level (401) 270-4040
- **Cheesecake Factory**
  Ground level (401) 270-4010
- **Uno Chicago Grill**
  Ground level (401) 270-4866

OTHER RESTAURANTS CLOSE TO CONVENTION CENTER

- **Agora (in Westin Hotel; breakfast, lunch and dinner)**
  One W. Exchange St. (401) 598-8011
- **Fleming's Prime Steakhouse & Wine Bar (in Westin Hotel; expensive)**
  One W. Exchange St. (401) 533-9000
- **Luxe Burger Bar (1 block)**
  5 Memorial Boulevard (401) 621-5893
- **McCormick & Schmick's Seafood (in Biltmore Hotel)**
  11 Dorrance St. (401) 351-4500
- **Murphy's Deli & Bar (1 block from Convention Center)**
  100 Fountain St. (401) 621-8467
- **Capital Grille (1 block; very expensive)**
  One Union Station (401) 521-5600
- **Ardeo (Mediterranean; 1 block; somewhat expensive)**
  One Union Station (401) 351-1400
- **Fatty McGee's Dublin Pub (2 blocks)**
  55 Union St. (401) 831-3288

ECLECTIC

- **Cuban Revolution (3 blocks from Convention Center)**
  50 Aborn St. (401) 331-8829
- **The Restaurant at AS220 (4 blocks)**
  113 Empire St. (401) 831-3663
- **The Red Fez (6 blocks)**
  49 Peck St. (401) 272-1212
- **Tini (4 blocks)**
  200 Washington St. (401) 383-2400

FINE DINING

- **Pot Au Feu (5 blocks from Convention Center)**
  44 Custom House Street (401) 273-8953
- **Bacaro (12 blocks from Convention Center)**
  262 South Water Street. (401) 751-3700
- **Gracie's (4 blocks from Convention Center)**
  194 Washington St. (401) 272-7811
- **Local 121 (4 blocks)**
  121 Washington St. (401) 274-2121
- **Bravo Brasserie (4 blocks)**
  123 Empire St. (401) 490-6112
- **New Rivers (8 blocks)**
  7 Steeple St. (401) 751-0350
- **Mill's Tavern (8 blocks)**
  101 North Main Street (401) 272-3331
- **Hemenway's Seafood Grill and Oyster Bar (10 blocks)**
  121 South Main Street (401) 351-8570
- **Ten Prime Steak and Sushi (6 blocks)**
  55 Pine St. (401) 453-2333
- **Cav (1 mile from Convention Center)**
  14 Imperial Place (401) 751-9164
- **Al Forno (1.2 miles from Convention Center)**
  577 South Main St. (401) 273-9760

FEDERAL HILL

A superb Italian restaurant district is located on Atwells Ave. and Spruce St., just west of the Convention Center (all price ranges). Federal Hill is close in distance, but on the other side of the Rte. 95 highway. Really worth a trip by taxi or on foot.

BROWN UNIVERSITY AREA

Many eateries are clustered around Brown University, particularly on Thayer and Hope Streets (1.2 miles from Convention Center). Notable eateries: Kabob and Curry (Indian) at 261 Thayer St. (401) 273-8844, East Side Pockets (Middle Eastern) at 278 Thayer St. (401) 453-1100, Nice Slice (Pizza) at 267 Thayer St. (401) 453-6423, and Sawadee (Thai) at 93 Hope St. (401) 831-1122. Wickenden St. (0.5 mi south of Brown, 1.2 mi from Convention Center) has many restaurants and art galleries.

OTHER RESOURCES

- **7-Eleven Convenience Store (3 blocks from Convention Center)**
  25 Dorrance St (401) 351-6287
- **CVS Pharmacy (Providence Place Mall; 1 block from, and connected to, RI Convention Center)**
  Ground level (401) 270-4440

Check out the "Program" section of the website for a detailed map of Providence restaurants and bars:
http://brown.edu/Conference/American_Society_of_Biomechanics/index.php

Welcome Fellow Biomechanists

On behalf of the ASB executive board, Brown University, Rhode Island Hospital, and the many people who have worked to make this conference happen, we would like to wish you a very hearty welcome to Providence! We are delighted to host the 34th Annual Meeting of the American Society of Biomechanics!

Participation in this year's conference has been strong following a trend that reflects the growing strength of the Society and of biomechanics research. Nearly 500 abstracts were submitted from researchers across the U.S. and 20 countries, from which 104 were selected for podium presentations and 357 for poster presentations. The meeting also includes four timely symposia, exciting keynote and award presentations, networking opportunities, interactive tutorials and lab tours. It is sure to be a stimulating, fun and productive four days – a moveable feast for biomechanists!

Brown University and Rhode Island Hospital are delighted to host this year's meeting. In Providence, biomechanics research is a collective enterprise with ongoing collaborations between investigators at several institutions, including Brown University, Rhode Island Hospital, and the Providence VA Medical Center. The interdisciplinary nature of the field is reflected in the diversity of departments with active biomechanics research programs, ranging from Orthopedics, to Ecology and Evolutionary Biology, to Computer Science. We hope you will have a chance to visit the campus and tour a lab while you are here. We are excited to bring such an important event to our community.

The Society and its Annual Meeting are run solely with volunteer labor. Each year, members' efforts allow us to enjoy conferences that are home-grown, friendly, and accessible – "the NPR of meetings," as one member put it. Many people and institutions deserve our heartfelt gratitude for making this conference possible.

First, the ASB Executive Board and the staff at Brown Conference Services provided invaluable advice and support regarding the mechanics of conference planning and organization, abstract reviewers spent many hours evaluating submissions, and numerous student volunteers have graciously (if not willingly) agreed to provide support before and during the meeting. We are grateful for all of their efforts.

In addition, several local institutions provided critical financial support: The Department of Orthopaedics, the Warren Alpert School of Medicine at Brown University, the Center for Restorative and Regenerative Medicine at the Providence VA Medical Center, and Rhode Island Hospital. We also gratefully acknowledge support from NIAMS and NBIB at the NIH.

And finally, it is you, the meeting participants, who make the event a worthwhile endeavor. We thank you for submitting abstracts, presenting talks and posters, participating, and enjoying this event!

We're confident you'll enjoy our Renaissance City, as well as the stimulating company of your fellow biomechanists. Enjoy Providence – take a Gondola ride, dine *al fresco* on Federal Hill, visit Brown's green, hug a Mr. Potato Head. We are glad to have you here, and we hope the week provides you with inspiration, companionship, and lifelong memories.

Sincerely,

J.J. Trey Crisco and Thomas Roberts	Douglas Moore	Darryl Thelen
Meeting Co-Chairs	**Head Local Organizing Committee**	**Program Chair**

The Meeting and Program Committees

ASB Meeting Committee

Elizabeth L. Brainerd, Ph.D. • Susan E. D'Andrea, Ph.D. • Alena Grabowski, Ph.D. • Sharon Swartz, Ph.D.

ASB Local Committee

Emily Abbott • Koosha Aslani • Liz Drewniak • Arlene Garcia • Nick Gidmark • Michelle Gosselin • Eni Halilaj • Cally Harper • Robert Kambic • Sarath Koruprolu • Dennis Kwon • Scott McAllister • Andrew Matson • Danny Miranda • David Paller • Tara Patterson • William Pfaff • Emilia Raimondo • Mike Rainbow • Dale Ricks • Joel Schwartz • Matt Shalvoy • Jody Soares • Beth Therrien • Natalie Wilhelm • Matt Williams

ASB Program Committee

Ahmet Erdemir • Ajit Chaudhari • Alaa Ahmed • Alejandro Espinoza Orías • Amy Silder • Andrew Karduna • Anita Vasavada • Brian Umberger • Chris Hass • Craig McGowan • Daniel Herman • Don Anderson • Elizabeth Hsiao-Wecksler • Eric Kennedy • Erika Nelson-Wong • Fan Gao • Francisco Valero-Cuevas • Gregory King • Gregory Sawicki • Heidi-Lynn Ploeg • Huub Maas • Jae Kun Shim • Jason Scibek • Jian Liu • Jill McNitt-Gray • Jill Schmidt • Jinger Gottschall • Katherine Saul Holzbaur • Kimbery Edginton Bigelow • Kotaro Sasaki • Kristian O'Connor • Kurt Manal • Laura Wojcik • Laurel Kuxhaus • Martin Tanaka • Michael Hahn • Michael Madigan • Michael Pavol • Naira Campbell-Kyureghyan • Nils Hakansson • Patrick Sparto • Paul Ivancic • Richard Hughes • Rob Siston • Samuel Ward • Sang Wook Lee • Silvia Blemker • Srinivas Tadepalli • Steven McCaw • Tamara Bush • Walter Herzog • William Ledoux • Yu Shu

Assistants to the Program Chair

Robert Bradford • Laura Chernak • Carrie Francis • Amy Lenz • Jen Sanfilippo • Anne Schmitz

ASB Executive Committee

President: Tom Buchanan, University of Delaware

President-Elect: Jill McNitt-Gray, University of Southern California

Past-President: Irene Davis, University of Delaware

Treasurer: Paul DeVita, East Carolina University

Treasurer-Elect: Gary Heise, University of Northern Colorado

Secretary: Michael Madigan, Virginia Tech

Program Chair-Elect: Wendy Murray, Northwestern University

Education Committee Chair: Nick Stergiou, University of Nebraska at Omaha and University of Nebraska Medical Center

Communications Committee Chair: Zong-Ming Li, Cleveland Clinic

Meeting Chairs: J.J. Trey Crisco and Thomas Roberts

Program Chair: Darryl Thelen

Newsletter Editor: Michelle Sabick, Boise State University

Student Representative: Becky Fellin, University of Delaware

Meeting Sponsor

The Society gratefully acknowledges the support of the following Corporate Members.

Meeting Information at a Glance

Conference Location

All of the academic meeting events (podium presentations, posters, mentoring sessions, etc.) will be held on the fifth floor of the Rhode Island Convention Center (RICC). Only the welcome receptions, banquet, and lab tours will be held off-site.

Registration

The registration desk is located on the 4th floor of the RICC. Registration will be staffed on Wednesday from 10:00 a.m. to 6:00 p.m., and Thursday and Friday from 8:00 a.m. to 5:00 p.m.

ASB Executive Board/Exhibitor's Reception

Wednesday, August 18, 5:30–6:00 pm

Danforth Room, RISD Museum

Attendance limited to ASB Executive Board, Exhibitor Representatives, and Organizers of the 2010 and 2011 Annual Meetings of the ASB.

General Opening Reception

Wednesday, August 18, 6:00–8:00 pm

Main Gallery, RISD Museum

Attendance is open to all meeting delegates, staff and exhibitor representatives

See Social Program (next page) for details.

Exhibitor Booths

Exhibitor booths will be located in the foyer of the main Ballroom (Halls A, C & E).

Exhibitors' Presentations

The exhibitors will be afforded the opportunity to make brief, technical presentations highlighting the use of their devices/technologies for basic biomechanics research. All exhibitor presentations will be held in Room 555A. The schedule for the exhibitor presentations will be posted at the meeting, and a paper copy will be included in the handouts distributed at registration.

Poster Presentations

There will be two formal poster sessions: **Thursday, from 4:30 p.m. to 6:00 p.m. and Friday from 4:30 p.m. to 6:00 p.m.** Odd-numbered posters will be presented on Thursday afternoon and even-numbered posters will be presented on Friday afternoon. At least one named author is required to be present at each poster during its designated poster session. Light refreshments (antipasto, cheeses, veggies, crackers, fresh fruit) and a cash bar will be available during the two formal poster sessions.

Podium Presentations

Each presenter is allotted 10 minutes for the presentation and 5 min for discussion. *Due to time constraints, speakers will not be allowed to use their own computers for podium presentations.* Speakers must upload their presentations to conference computers on the day prior to their talk. The speaker ready room (558B) is available from 10:00 a.m.–5:00 p.m. on Wednesday, and from 8:00 a.m. to 5:00 p.m. on Thursday and Friday.

Breakfasts

7 a.m. Thursday, Friday and Saturday

Seasonal fruit bowl, freshly baked muffins, English muffins and bagels served with butter, cream cheese, jellies and peanut butter. Coffee, decaf, tea, orange and apple juice.

Coffee Breaks

AM (Thursday, Friday and Saturday)

Coffee, decaf, tea, orange and apple juice, and assorted pastries.

PM (Thursday and Friday)

Assorted snack bars, whole fruit and fresh coffee.

Lunches

12:30 Thursday and Friday

Box lunches will be provided. There will be a choice of turkey, ham or grilled vegetable wrap. All lunches will include chips, whole fruit, a jumbo cookies for dessert and a beverage.

Banquet

Friday, August 20, 6:00–10:00 pm

A traditional Rhode Island Lobster Boil will be held at the Herreschoff Marine Museum and America's Cup Hall of Fame in Bristol, Rhode Island (see page 5 for more details).

Buses will depart from Sabin Street in front of the Rhode Island Convention Center (RICC) starting at 5:45 p.m., and will return to the RICC at approximately 10:30 p.m.

Internet Access

Free wireless access will be available in two "hotspots" within the Rhode Island Convention Center (RICC): The Terrace Café and Rotunda (see RICC map on page 40). If you want the abstracts with you during the meeting you are encouraged to download the Proceedings ahead of time.

Networking and Professional Development

Diversity Luncheon

(Thursday, August 19, Room 557, 12:30–1:30 pm)

An open discussion regarding diversity-related issues and personal experiences and how they impact the careers of minority biomechanists. Reservations are required as seating is limited. Contact: Sai Vikas Yalla (yalla@uwm.edu).

Student Mentoring Roundtable

(Thursday, August 19, Room 557, 6:15–7:15 pm)

This session is designed to create a casual atmosphere where students can ask questions and gain insight from world-class researchers. Past mentoring sessions have included discussions about CVs, finding the right job, contract negotiation, networking at ASB, and research in industry versus academia. This session is separate from ASB's one-on-one mentoring programs, and students may attend this session without participating in the mentor program. Contact: Becky Fellin (fellin@udel.edu)

Junior Faculty Mentoring Roundtable

(Thursday, August 19, Room 555B, 6:15–7:15 pm)

This mentoring session is intended to provide junior faculty and postdocs "best practice" tips for being successful in research, teaching, and service (and life away from the lab). A panel of distinguished senior faculty members representing diverse fields within biomechanics and a variety of career stages will help lead discussions. Contacts: Liz Hsiao-Wecksler (ethw@illinois.edu) and Kim Edginton Bigelow (bigeloke@notes.udayton.edu)

Women in Science Breakfast

(Friday, August 20, Room 557, 7:00–8:00 am)

This breakfast is an informal, enjoyable gathering with other women members of ASB. Come and catch up with old friends and meet some new ones! Reservations are required as seating is limited to 100 conference attendees. Contact: Becky Fellin (fellin@udel.edu)

Social Program

Opening Reception – RISD Museum

(Wednesday, August 18, 6:00–7:30 pm)

- Located at 20 North Main Street, **The Museum of Art at the Rhode Island School of Design**, also known as the **RISD Museum**, is Rhode Island's leading museum of fine and decorative art, housing a collection of 84,000 objects of international significance. It is southeastern New England's only comprehensive art museum and is accredited by the American Association of Museums.
- The Opening Reception will be presented by the Artists at RISD Caterers, and will feature a selection of locally-inspired hors d' oeuvres, wine, beer and non-alcoholic beverages.
- During the reception the entire Museum will be available to ASB Meeting Attendees

Banquet – Herreshoff Marine Museum

(Friday, August 20, 6:00–10:00 pm)

- **Herreshoff Marine Museum/America's Cup Hall of Fame** Bristol, RI
- The **Herreshoff Marine Museum/America's Cup Hall of Fame** is dedicated to the education and inspiration of the public through presentations of the history and innovative work of the Herreshoff Manufacturing Company and the America's Cup competition.
- The Museum, bordering beautiful Narragansett Bay, in Bristol, Rhode Island, is one of the nation's most important historic maritime treasures. The museum regularly hosts classic yacht regattas, sponsor symposia on classic yacht design and restoration, and operates an outstanding sailing school for youth and adults.
- The banquet will include a classic Rhode Island Lobster Boil, prepared by legendary Newport caterer T.R. McGrath. The menu will include Quahog chowder, "stuffies," steamers, mussels, assorted vegetables and dip, garden salad, lobster, barbecued chicken, potato salad, watermelon, brownies and cookies (and a vegetarian pasta option), as well as free beer, wine, soda and water.
- Busses depart from the RICC, 1 Sabin Street, beginning at 5:45 p.m.

5k River Run

(Saturday, August 21, 7:00 am)

Join us Saturday, August 21st at 7 am for the 2nd Annual ASB 5k race. The course will take you on a tour through the historic streets and along the waterfront of Downtown Providence. The run will start and finish in the same location within walking distance of the conference hotel and convention center. Check out the website for course details and get ready for some friendly competition. See the ASB Providence 2010 web site for updates.

Instructions for Presenters

Poster Presentations

Posters can be mounted on free-standing poster boards with either push pins or Velcro tabs (please bring your own pins or tabs). Posters should be mounted by 8:00 a.m. on Thursday, August 19th. Posters are to be removed by 2:00 p.m. on Saturday, August 21st. Any posters not removed will be discarded.

There will be two formal poster sessions: **Thursday, from 4:30 p.m. to 6:00 p.m. and Friday from 4:30 p.m. to 6:00 p.m.** Odd-numbered posters will be presented on Thursday afternoon and even-numbered posters will be presented on Friday afternoon. At least one named author is required to be present at each poster during its designated poster session. Light refreshments (antipasto, cheeses, veggies, crackers, fresh fruit) and a cash bar will be available during the two formal poster sessions.

Podium Presentations

Each presenter is allotted 10 minutes for the presentation and 5 min for discussion. During the discussion please approach a microphone, and state your name and affiliation before asking your question.

Due to time constraints, speakers will not be allowed to use their own computers for podium presentations. **Speakers must upload their presentations to the conference computers in the speaker ready room on the day prior to their talk.** The speaker ready room (558B) is available from 10:00 a.m.–5:00 p.m. on Wednesday, and from 8:00 a.m. to 5:00 p.m. on Thursday and Friday.

Speaker Ready Room (558B)

Wednesday, August 18, 10:00 am–5:00 pm
Thursday & Friday, August 19 & 20, 8:00 am–5:00 pm

Speakers must upload their presentations to the conference computers in the speaker ready room on the day prior to their talk.

Tutorials

Wednesday, August 18

🕓 12:30–2:00 pm, Hall C

Tutorial 1: Grant Writing for the NIH: New Guidelines, Old Tricks

Presenters: Thomas Buchanan, PhD and Nick Stergiou, PhD

In this tutorial, two members of the ASB Executive Board will present (1) the new guidelines adopted by the NIH for writing and reviewing applications, and (2) what stays always the same in these applications like writing good hypotheses!

Wednesday, August 18

🕓 12:30–2:45 pm, Hall E

Tutorial 2: X-ray Reconstruction of Moving Morphology (XROMM): Hardware, Software, and Validation Procedures for Model-Based X-ray Motion Analysis

Presenter: Beth Brainerd, PhD

The past few years have seen rapid growth in the use of biplanar videoradiography (fluroscopy) combined with model-based motion analysis for measuring 3D skeletal kinematics. At Brown University we have been developing a set of model-based motion analysis methods we are calling X-ray Reconstruction of Moving Morphology (XROMM; see our web site www.xromm.org). This tutorial will include an overview of hardware and software development, and demonstrations of software for marker-based XROMM (also called dynamic RSA) and markerless XROMM. Methods for measuring precision and accuracy and for validating markerless XROMM will be discussed.

Lab Tours

Wednesday, August 18

Tour 1: 2:00–5:00 pm

The Gait and Motion Analysis Laboratory and the Neurorehabilitation Lab, The Center for Restorative and Regenerative Medicine, Providence Veterans Administration Medical Center.

The Gait and Motion Analysis Laboratory is a part of the Center for Restorative and Regenerative Medicine, a collaboration between the Providence VA Medical Center (VAMC) and Brown University. The mission of the Center is to improve function for individuals with limb trauma by developing technologically advanced solutions for the restoration of limb function. The research program in the Gait and Motion Analysis Lab is directed towards developing advanced technology assessment tools to complete the restoration of function by advanced rehabilitation. Currently, the lab is focused on the evaluation and development of prostheses to improve function in lower extremity amputee patients, osteoarthritis and the use of virtual reality in rehabilitation. Participants will also tour the Neurorehabilitation Lab at the Center for Restorative and Regenerative Medicine. The Neurorehabilitation Lab is focused on upper extremity rehabilitation post-stroke and lower extremity rehabilitation in individuals with Multiple Sclerosis and Parkinson's disease. The lab uses the Lokomat, Anklebot robots, MIT-Manus robots, Armeo robots, Near-Infrared Spectroscopy, and GAITRite instrumented electronic walkway to study and evaluate subjects.

- There will be two opportunities to tour the Providence VAMC.
  - After Tutorial 1, buses will leave the Rhode Island Convention Center (RICC) at 2:15 pm. After visiting the VAMC, this bus will then transport attendees to Tour 2. You will return to downtown Providence by a 10 min. walk. Those wishing not to attend Tour 2 will be transported back to the RICC on this bus.
  - After Tutorial 2, buses will leave the RICC at 3:30, visit the VAMC, and then this bus will return to the RICC at 5:00 pm.

Tour 2: 3:15–5:00 pm

Brown University facility for X-ray Reconstruction of Moving Morphology (XROMM) and Comparative Biomechanics.

This lab tour will feature new technology for three-dimensional imaging of rapid skeletal motions, XROMM. Participants will also tour comparative biomechanics labs at Brown, including laboratories that study fish feeding and biomechanics, bat flight, and frog jumping.

See the web site www.xromm.org for more details of the facility. This tour complements Tutorial 2.

- The lab tour will begin at 3:15 at the Biomed Building (171 Meeting St.) on the campus of Brown University (see map on inside back cover). Participants have two options:
  - Take Tour 1 first (see Tour 1) after Tutorial 1 and then get transported to the XROMM and Comparative Biomechanics Laboratory. You will return to downtown Providence by a 10 min. walk.
  - After Tutorial 2, walk up to the XROMM and Comparative Biomechanics Laboratory. You will return to downtown Providence by a 10 min. walk.

Plenary and Awards Sessions

Thursday, August 19

🕘 11:30 am–12:30 pm, Hall A

Keynote Address

Fish Robotics and Biomechanics

George Lauder, PhD, Harvard University

There are over 28,000 species of fishes, and a key feature of this remarkable evolutionary diversity is a great variety of propulsive systems used by fishes for maneuvering in the aquatic environment. Fishes have numerous control surfaces (fins) which act to transfer momentum to the surrounding fluid. Most fishes are unstable and use several control surfaces simultaneously for propulsion and to maintain body position. In this presentation I will discuss the results of recent experimental kinematic and hydrodynamic studies of fish fin function, and their implications for the construction of robotic models of fishes. Recent high-resolution video analyses of fish fin movements during locomotion show that fins undergo much greater deformations than previously suspected. Experimental work on fin mechanics shows that fishes possess a mechanism for actively adjusting fin surface curvature to modulate locomotor force. Fish fin motion results in the formation of vortex rings of various conformations, and quantification of vortex rings shed into the wake by freely-swimming fishes has proven to be useful for understanding the mechanisms of propulsion. Experimental analyses of propulsion in freely-swimming fishes have lead to the development of three self-propelling robotic models: a pectoral fin robotic device, a robotic fish tail, and a flapping flexible foil robotic model of fish body deformation; I will discuss the design of each robotic model along with recent results and their implications for understanding the biomechanics of underwater propulsion.

About the Speaker

Dr. Lauder is a world leader in the study of the form, function and evolution of the musculoskeletal system of fish. His work has produced some of the major insights into the mechanical function of the locomotor and feeding apparatus of fish. Current projects in his lab pioneer the use of robotics to explore the mechanical design of fins, the mechanisms of hydrodynamic propulsion, and the potential for bio-inspired robotic swimming devices

Plenary Sessions continued

Friday, August 20th

11:30 am–12:30 pm, Hall A

Keynote Address

From Vibrating Insoles to Synthetic Gene Networks

James J. Collins, PhD, Boston University

In this talk, we describe how nonlinear dynamical approaches can be used to study, mimic and improve biological function at multiple scales, ranging from whole-body dynamics to gene networks. We describe, for example, how input noise can be used to enhance human sensory function and motor control. Specifically, we show that touch sensation and balance control in young and older adults, patients with stroke, and patients with diabetic neuropathy can be improved with the application of sub-sensory mechanical noise, e.g., via vibrating insoles. We describe how this work has led to the creation of a new class of medical devices to address complications resulting from diabetic neuropathy, restore brain function following stroke, and improve elderly balance. We also describe how techniques from nonlinear dynamics and molecular biology can be used to model, design and construct engineered gene networks, leading to the development of the field of synthetic biology. We discuss the implications of synthetic gene networks for biotechnology, biomedicine and biocomputing.

About the Speaker

Dr. Collins is a renowned bioengineer and inventor. His use of nonlinear dynamics to model and mimic biological function has led to several medical devices, including noise-based sensory prosthetics that improve locomotor function and balanced in the elderly and patients with compromised neuromotor control. He is a pioneer in systems biology, and currently developing methods and applications for reverse engineering gene regulatory networks. Dr. Collins has received numerous awards and distinctions, including a MacArthur Foundation "Genius Award" and an NIH Director's Pioneer Award. He is also a past recipient of the ASB Young Scientist Post-Doctoral Award.

Friday, August 20th

2:00 pm–3:00 pm, Hall A

Borelli Lecture

The Role of Biomechanics in the Health, Degeneration, and Repair of the Synovial Joint

Farshid Guilak, PhD

Laszlo Ormandy Professor of Orthopaedic Surgery, Duke University Medical Center

Osteoarthritis is a painful and debilitating disease of the joints that is characterized by progressive degeneration of the articular cartilage that lines the joint surfaces. The etiology of osteoarthritis is poorly understood, although it is now well accepted that biomechanical factors play an important role in the onset and progression of this disease. The primary goal of our studies has been to determine the mechanisms by which mechanical loading affects the physiology of our joints. Using a hierarchical approach to span different systems ranging from clinical studies and in vivo animal models to studies of tissue, cellular, and subcellular mechanics, we have identified specific mechanical signaling pathways that appear to play a role in cartilage physiology as well as pathology. These pathways may provide novel pharmacologic targets for the modification of inflammation or cartilage degeneration in osteoarthritis. Additionally, our studies have focused on tissue engineering approaches for repairing cartilage damage with osteoarthritis. Using novel textile processes that allow weaving of biomaterial fibers in three dimensions, we have created functionalized bioactive scaffolds that can recreate many of the complex biomechanical properties and anatomic features of articular cartilage. In combination with a multipotent population of stem cells isolated from subcutaneous fat, we have developed a tissue-engineering approach for resurfacing osteoarthritic joint surfaces. Taken together, these studies emphasize the critical role that biomechanics plays in the physiology as well as pathology of the joint, and demonstrate the importance of biomechanical factors in functional tissue engineering of cartilage and other joint tissues.

About the Borelli Award Recipient:

Dr. Guilak's research has focused on cellular mechanics and tissue engineering of articular cartilage in the context of osteoarthritis. He is a true pioneer in the investigation of chondrocyte biomechanics and mechanotransduction, having been the first to characterize its mechanical properties in situ and ex situ, in health and disease, using a variety of exquisite testing methods. He has also played a critical leadership role in the development of the field of "Functional Tissue Engineering".

His research in this area has focused on the regeneration of articular cartilage using novel 3D biomaterial structures that are explicitly designed to mimic the biomechanical properties of native articular cartilage.

Plenary Sessions continued

Saturday, August 21st

9:30 am–10:45 am, Hall A

Journal of Biomechanics Award Finalists

The mechanical properties of the endomysium affect propensity for muscle fiber injury near the myotendinous junction

Sharafi B, Blemker S
University of Virginia

How do step width and arm swing affect energetic cost and lateral balance during running?

Arellano C, Kram R
University of Colorado

Clinical Biomechanics Award Finalists

Patients with patellofemoral pain exhibit elevated bone metabolic activity at the patellofemoral joint

Draper C, Besier T, Frederickon M, Beau G, Delp S, Quon A, Gold G
Stanford University

Virtual pre-operative reconstruction planning for comminuted articular fractures

Thomas T, Anderson D, Willis A, March J, Brown T.

University of Iowa.

11:00 am–11:15 am, Hall A

Young Scientist Predoctoral Award

Theoretical Analysis of Limitations to Maximum Sprinting Speed Imposed by Muscle Mechanical Properties

Ross Miller, University of Massachusetts Amherst

11:15 am–11:30 am, Hall A

Young Scientist Postdoctoral Award

A Phenomenological Muscle Model to Assess History Dependent Effects in Human Movement

Craig McGowan, PhD, University of Texas at Austin

Saturday, August 21st

11:30 am–12:15 pm, Hall A

James J. Hay Memorial Lecture

Sport Biomechanics: Equipment and Performance

Darren Stefanyshyn, PhD,
University of Calgary

From a performance perspective, it is very important to optimize the energy transfer between athlete and equipment. This is generally achieved by: maximizing the (conservative) energy which is returned, minimizing the (non-conservative) energy which is lost and/or optimizing the musculoskeletal system. While these are rather simple mechanical concepts, the complex interaction between the athlete and the piece of equipment requires a detailed understanding of sport biomechanics. Additionally, how the uniqueness of each individual athlete relates to specific equipment properties must be understood. Over the past 30 years, sport biomechanists and sport equipment manufacturers have investigated ways of improving athletic equipment to enhance performance. The result is equipment that is stronger, lighter, more durable and more pleasant to use. Consequently, sport performances are faster, higher, longer and more accurate than ever before.

About the Hay Award Recipient:

Dr. Stefanyshyn's contributions to the biomechanics community have been virtually exclusively in the area of sports biomechanics, specifically work related to improving performance through optimizing shoe design in track sprinters, golf club design for average and world class golf players, hockey sticks for improving the accuracy and speed of slap shots, and a variety of research related to the aerodynamic design and musculoskeletal support of sportswear in athletes ranging from downhill skiers to speed skaters and runners.

12:15 pm -12:45 pm, Hall A

ASB Travel Grant

Zifchock R, Motion Analysis Laboratory, Hospital for Special Surgery

Gao F, Department of Health Care Sciences, UT Southwestern Medical Center at Dallas

Symposia

Thursday, August 19, 3:15–4:30 pm

Machines Inspired by Animal Locomotion

organized by Rodger Kram, PhD, University of Colorado

Hall C

Biologically inspired design is a remarkably active and fruitful area of interdisciplinary collaboration among engineers, computer scientists, and comparative biologists. Active areas of research in this field include the development of robots that draw on principles of animal locomotion to improve their swimming, flying, walking or running performance. Speakers in this symposium will present their latest ideas and machines. These talks will complement the presentation by one of the keynote speakers, George Lauder, who has been using robotic fish to explore principles of fish locomotion.

3:15 Experiments with Robotic Birds and Perching Planes

Russ Tedrake, Ph.D.
Computer Science and Artificial Intelligence Lab
Massachusetts Institute of Technology

3:35 BigDog and PETMAN: Legged Robots Inspired by Animals

Marc Raibert, PhD
Boston Dynamics

3:55 Bio-inspired Robot Design for Legged Locomotion

Sangbae Kim, PhD
Biomimetic Robotics Lab
Massachusetts Institute of Technology

4:15 Panel Discussion

Applications of Bi-Plane Fluoroscopy/ X-Ray Technology in Basic and Applied Biomechanics Research

organized by Michael R. Torry, PhD, Steadman-Philippon Research Institute

Hall A

The purpose of this ASB symposia is to present novel techniques and data regarding the uses of bi-plane fluoroscopy/ x-ray in 3D motion analysis. The focus of these talks will be applied in nature with emphasis placed on summary of knowledge gained from this new technology with regard to shoulder, knee, foot/ankle and animal kinematics.

3:15 Applications of Biplane Videoradiography and X-Ray Reconstruction of Moving Morphology (XROMM) to Comparative Biomechanics Research

Elizabeth Brainerd, PhD
Brown University

3:30 Biplane X-Ray Analysis of In-Vivo Shoulder and Tendon Function

Michael Bey, PhD
Henry Ford Hospital

3:45 Using Biplane Fluoroscopy to Quantify Foot Bone Motion

William Ledoux, PhD
VA Puget Sound

4:00 Applications of Dynamic Stereo X-Ray to in vivo Knee Research

Scott Tashman, PhD
University of Pittsburgh

4:15 Panel Discussion

Symposia continued

Friday, August 20, 3:15–4:30 pm

Robotic Lower Limb Orthoses & Prostheses

organized by Dan Ferris, PhD, University of Michigan

Hall C

Advances in robotic technology have led to new designs for powered lower limb orthoses and prostheses. The technological advancements will continue to accelerate in coming years, making innovative commercial products viable by the end of the decade. Key hurdles that still need to be overcome include maximizing device efficiency, developing controllers that facilitate user control, and achieving adaptability for different environments and tasks. This symposium will bring together experts in the field to discuss their recent accomplishments and outline how major challenges can be overcome in the near future. This symposium will complement ongoing research at the Center for Restorative and Regenerative Medicine at the Providence VA Medical Center, affiliated with Brown University.

3:15 Work and Energy for Mobile Human Walking Assistance

Art Kuo, PhD
University of Michigan

3:35 Robotic Lower Limb Orthoses: Goals, Obstacles, and Current Research

Dan Ferris, PhD
University of Michigan

3:55 Powered Ankle-Foot Prosthesis Improves Metabolic Demand of Unilateral Transtibial Amputees during Walking

Hugh Herr, PhD
Massachusetts Institute of Technology

4:15 Panel Discussion

3D Models of Muscle-Tendon Behavior

organized by Silvia Blemker, PhD, University of Virginia

Hall A

The last several decades have brought significant advances in computational modeling of skeletal muscle. Several groups have developed techniques for simulating the complex three-dimensional morphology and behavior of muscle and tendon. These models have provided many insights into the complex and nonuniform interactions between tendon, aponeurosis, and muscle during movement. The goal of the symposium is to bring together leaders in this area to discuss the applications, approaches, experimental validation, challenges, and future opportunities for 3D muscle-tendon models.

3:15 Dynamic Simulation of Musculoskeletal Biomechanisms in 3D

Dinesh Pai, PhD
University of British Columbia

3:30 3D Model of Skeletal Muscle to Predict Intramuscular Pressure

Kenton Kaufman, PhD
Mayo Clinic

3:45 Modeling to Study Muscular Mechanics Within the Context of Fascial Integrety: Linked Fiber-Matrix Mesh Model

Can Yucesoy, PhD
Bogaziçi University

4:00 3D Muscle Modeling with Application to Muscle Strain Injury

Silvia Blemker, PhD
University of Virginia

4:15 Panel Discussion

Podium Sessions

Thursday, August 19, 8:00–9:15 am

	Hall C	Hall A	Hall E
	Rehabilitation	**Tissue Mechanics**	**Methods**
Session chairs	Kurt Manal, PhD *University of Delaware* Nils Hakansson, PhD *University of Delaware*	Don Anderson, PhD *The University of Iowa* Mark Carl Miller, PhD *University of Pittsburgh.*	Tamara Reid Bush, PhD *Michigan State University* Elizabeth T. Hsiao-Wecksler, PhD *University of Illinois at Urbana-Champaign*
8:00	**Compensatory Step Training of Unilateral, Above-Knee Amputees: a Potential Intervention for Reducing Trip-Related Falls** Crenshaw J, Kaufman K, Grabiner M University of Illinois at Chicago	**Optimization-Based Assessment of the Transverse Compresssive Mechanical Properties of the Digital Flexor Tendons and the Median Nerve** Main E, Goetz J, Rudert M, Goreham-Voss C, Brown T *University of Iowa*	**Improving Regions of Deviation Gait Symmetry Analysis with Pointwise T-Tests** DiBerardino L, Ragetly C, Hong S, Griffon D, Hsiao-Wecksler E *University of Illinois at Urbana-Champaign*
8:15	**Are the Effects of Gait Retraining Similar Between the Trained and the Untrained, Contralateral Limb of Runners?** Fellin R, Davis I *University of Delaware*	**An Experimental Platform for Measuring the Mechanical Behaviour of Tendons in Torsion** Martin L, Buckley P, Zavatsky A *University of Oxford*	**Comparative Assesment of Bone Pose Estimation Using Point Cluster Technique and OPENSIM** Lathrop R, Thompson J, Chaudhari A, Siston R *Ohio State University*
8:30	**Effect of Hip Muscle Strengthening on Frontal Plane Gait Mechanics in Patients with Knee Osteoarthritis** Park S, Pohl M, Lloyd C, Baxter J, Wiley P, Ferber R *University of Calgary*	**An Objective Quantitative Comparison of Structural Damage from Differing Rabbit OA Models** Goreham-Voss C, Tochigi Y, McKinley T, Brown T *University of Iowa*	**Human Gait Recognition Performance Prediction from 3D Resolution Simulation Using Ground Truth Motion Capture Data** Fullenkamp A, Campbell B, Bowden D, Hess C *711th Human Performance Wing*
8:45	**Weight-Bearing Asymmetry and Clinical Measures of Impairment and Function Before and After Total Knee Arthroplasty** Christiansen C, Robertson T, Stevens-Lapsley J *University of Colorado Denver*	**AFM Analysis of Cartilage Degradation in a Rat Model Following ACL Transection** Waller K, Darling E, Jay G *Brown University*	**Segmental Kinematic Analysis Using a Tridimensional Reconstruction of Rat Hindlimb: Comparison Between 2D and 3D Joint Angles** Joao F, Amado S, Armada-da-Silva P, Maurício A, Veloso A *Technical University of Lisbon*
9:00	**Joint Loads in ACL-Deficient Individuals After Neuromuscular Training** Gardinier E, Manal K, Buchanan T, Snyder-Mackler L *University of Delaware*	**The Orientation of Collagen Fibers of the Transverse Carpal Ligament** Prantil R, Xiu K, Kim K, Gaitan D, Sacks M, Woo S, Li Z *University of Pittsburgh*	**A Novel Technique Quantifying Phalangeal Interface Pressures at the Hand-Handle Interface** Sinsel E, Gloekler D, Wimer B, Warren C, Wu J, Buczek F *National Institute for Occupational Safety and Health*

Podium Sessions

Thursday, August 19, 9:45–11:00 am

	Hall C	Hall A	Hall E
	Neurorehabilitation	**Muscle**	**Injury**
Session chairs	Jinger Gotschall, PhD *Pennsylvania State University* Keith Gordon, PhD *Rehabilitation Institute of Chicago*	Gregory Sawicki, PhD *North Carolina State University* Dominic Farris, PhD *North Carolina State University*	Chris Powers, PT, PhD *University of Southern California* Irene Davis, PhD, PT *University of Delaware*
9:45	**Elliptical Exercise Improves Walking Mechanics in Multiple Sclerosis Patients** Huisinga J, Stergiou N *University of Nebraska at Omaha*	**Decoupling of Muscle Shortening and Joint Kinematics During Frog Jumping** Astley H, Roberts T *Brown University*	**Kinetic and Kinematic Differences in Female Runners with Iliotibial Band Syndrome: The Effects of Fatigue** Zifchock B, Brown A, Hillstrom H *Hospital for Special Surgery*
10:00	**Relationships Between Muscle Contributions to Walking Subtasks and Functional Walking Status in Persons with Post-Stroke Hemiparesis** Hall A, Peterson C, Kautz S, Neptune R *University of Texas at Austin*	**The Effects of Denervation and Self-Reinnervation in the Guinea Fowl Lateral Gastrocnemius** Carr J, Chao L, Biewener A *Harvard University*	**Patellar Tracking Measures Correlate with Vastus Medialis Onset Delay in Maltracking Patellofemoral Pain Subjects** Pal S, Draper C, Fredericson M, Gold G, Delp S, Beaupre G, Besier T *Stanford University*
10:15	**Mechanical Recovery Influenced by Dorsiflexor Not Plantarflexor Stimulation in Post-Stroke Gait** Hakansson N, Kesar T, Reisman D, Binder-Macleod S, Higginson J *University of Delaware*	**Limb Muscle Function During High-Powered Energy Absorption** Konow N, Azizi E, Roberts T *Brown University*	**Altered Knee Muscle Reflex Activity During a Cutting Maneuver is Influenced by Motor Learning Not Neuromuscular Training** Kipp K, Brown T, McLean S, Palmieri-Smith R *University of Michigan*
10:30	**Constant Speed Practice on a Treadmill Can Maintain Lower Extremity Kinetics for People Post Stroke** *Wutzke C, Lewek M* *University of North Carolina at Chapel Hill*	**Passive Properties of Muscle Fibers Are Velocity Dependent** Rehorn M, Blemker S *University of Virginia*	**Approximate Entropy of Stride-To-Stride Intervals Following ACL Injury** Rhea C, Kiefer A, D'Andrea S, Warren W, Aaron R *Brown University*
10:45	**Muscle Contributions to Propulsion in Post-Stroke Hemiparetic Subjects Following Locomotor Training** Allen J, Kautz S, Neptune R *University of Texas at Austin*	**Regional Stiffening of Mouse Tibialis Anterior Tendons with Age** Wood L, Arruda E, Brooks S *University of Michigan*	**Quadriceps Strength and Neuromuscular Strategies Continue to Improve Two Years After ACL Reconstruction** Roewer B, Di Stasi S, Snyder-Mackler L *University of Delaware*

Podium Sessions

Thursday, August 19, 1:45–3:00 pm

	Hall C	Hall A	Hall E
	Motor Control	**Knee**	**Bone**
Session chairs	Alaa Ahmed, PhD *University of Colorado* Helen Huang, PhD *University of Colorado*	Ajit Chaudhari, PhD *The Ohio State University* Joe Seay, PhD *U.S. Army Research Institute of Environmental Medicine*	Heidi-Lynn Ploeg, PhD *University of Wisconsin-Madison* Jill Schmidt, PhD *University of Wisconsin-Milwaukee*
1:45	**Motor-Unit Pool Properties Contribute to Continuous and Discrete Force Variability** Hu X, Newell K *Pennsylvania State University*	**The Effect of External Loading on the 3D Patellar Tendon Moment Arm Measured with Dynamic MRI** Schmitz A, Westphal C, Thelen D *University of Wisconsin-Madison*	**An Integrated Modeling Method for Bone Strain Analysis** Leib D, Wang H, Dugan E *Boise State University*
2:00	**Rotational Object Perturbations Result in Characteristic Types of Kinematic Grip Responses** De Gregorio M, Santos V *Arizona State University*	**Open Knee: A 3D Finite Element Representation of the Knee Joint** Sibole S, Bennetts C, Borotikar B, Maas S, van den Bogert A, Weiss J, Erdemir A *Cleveland Clinic*	**Finite Element Prediction of Surface Strain and Failure Load at the Distal Radius Using Simplified Boundary Conditions** Edwards W, Troy K *University of Illinois at Chicago*
2:15	**Biomechanical and Experimental Confounds to the Detection of Neurally-Generated Muscle Synergies** Kutch J, Kurse M, Hentz V, Lightdale N, Fassola I, Valero-Cuervas F *University of Southern California*	**Position of the Quadriceps Muscle Actuator Influences Knee Loads During Simulated Squat Testing** Hast M, Piazza S *Pennsylvania State University*	**Does Frequency Effect Fatigue Fracture of Spine Motion Segments During Repetitive Loading?** Yalla S, Campbell-Kyureghyan N *University of Wisconsin-Milwaukee*
2:30	**Prehension Control while Performing Circular Arm Movements** Slota G, Latash M, Zatsiorsky V *Pennsylvania State University*	**Associations Between Anterior Knee Pain and Patellofemoral Kinematics in Cerebral Palsy** Sheehan F, Behnam A, Alter K *National Institutes of Health*	**Mechanical Loading of the Mouse Tibia Stimulates Localized Bone Adaptation** Bhatia V, Troy K *University of Illinois at Chicago*
2:45	**Maximal Voluntary Force, But Not Submaximal Steadiness, is Limited by a Low-Friction Condition During Index Finger Pressing Tasks** Keenan K, Collins J, Massey W, Walters T *University of Wisconsin-Milwaukee*	**The Association Between Patella Alignment and Femoral Trochlear Geometry** Teng H, Chen Y, Powers C *University of Southern California*	**Validation of a Micro-CT Approach for Characterization of Murine and Human Bone in Osteogenesis Imperfecta** Jameson J, Slavens B, Molthen R, Smith P, Harris G *Marquette University*

Podium Sessions

Friday, August 20, 8:00–9:15 am

	Hall C	Hall A	Hall E
	Orthopedics	Neuromechanics	Gait
Session chairs	Rob Siston, PhD *The Ohio State University* Richard Hughes, PhD *University of Michigan*	Francisco Valero-Cuevas, PhD *University of Southern California* Wendy Murray, PhD *Northwestern University*	Amy Silder, PhD *Stanford University* Ray Browning, PhD *Colorado State University*
8:00	Three Dimensional Fracture Mechanics of Ceramic Total Hip Bearings Elkins J, Pedersen D, Callaghan J, Brown T *University of Iowa*	Higher Antagonist Co-Contraction in Hand Osteoarthritis Leads to Detrimental Joint Mechanics Lee S, Schnitzer T, Kamper D *Rehabilitation Institute of Chicago*	Vertical Ground Reaction Forces Increase Over Time During 60 Minutes of Forced-Cadence Marching Seay J, Gutekunst D, Frykman P *U.S. Army Research Institute of Environmental Medicine*
8:15	Mason II Fractures with Three Millimeter Displacement Require Reduction Drushel M, Palmer G, Baratz M, Miller M *Allegheny General Hospital*	Proprioceptive Acuity in the Frontal and Sagittal Planes in Knee Osteoarthritis Cammarata M, Dhaher Y *Northwestern University*	Relative Sensitivity of Net Muscular Moments to Changes in Walking Speed and Body-Weight Support Goldberg S, Stanhope S *Hofstra University*
8:30	Design of a 1st Metatarsophalangeal Hemi-Arthroplasty Implant Based on Morphometric Data Kumar A, Donley B, Cavanagh P *University of Washington*	Role of Proprioception and Foot Somatosensation in Detecting Slipping Accidents Beschorner K, Redfern M, Cham R *University of Wisconsin-Milwaukee*	Positive and Negative Muscle Work in Lean and Obese Adults During Incline and Decline Walking DeVita P, McNally M, Rider P, Copple T, Long B, Kulas A, Hortobagyi T *East Carolina University*
8:45	The Biomechanical Effects of Variability in Femoral and Tibial Component Rotational Alignment During Total Knee Arthroplasty in a Simulated Oxford Rig Thompson J, Hast M, Granger J, Piazza S, Siston R *Ohio State University*	Learning Uncertain Dynamics for Postural Control Ahmed A, Wolpert D *University of Colorado at Boulder*	Moving and Shaking: Soft Tissue Work in Human Walking Zelik K, Kuo A *University of Michigan*
9:00	Tibial Tuberosity Medialization Alters Tibiofemoral Kinematics Along with Patellofemoral Pressure Distribution Elias J, Mani S, Saranathan A, Kirkpatrick M, Gump L, Cosgarea A *Akron General Medical Center*	Neuronal Noise Influences Gait Variability and Fall Risk in a Dynamic Walking Model Roos P, Dingwell J *University of Texas at Austin*	Gait Characteristics of Simulated Lunar Locomotion Hanson A, Gilkey K, Weaver A, Perusek G, Thorndike D, Kutnick G, Grodsinsky C, Rice A, Cavanagh P *University of Washington*

Podium Sessions

Friday, August 20, 9:45–11:00 am

	Hall C	Hall A	Hall E
	Computational Modeling	**Joint Mechanics**	**Pathological Gait**
Session chairs	Jeff Reinbolt, PhD *University of Tennessee* Ahmet Erdemir, PhD *Cleveland Clinic*	Paul Ivancic, PhD *Yale University* Michael Rainbow *Brown University*	Michael E. Hahn, PhD *University of Washington* Todd D. Royer, PhD *University of Delaware*
9:45	**Evaluation of Different Projectiles in Matched Experimental Eye Impact Simulations** Weaver A, Kennedy E, Duma S, Stitzel J *Virginia Tech-Wake Forest University Center for Injury Biomechanics*	**Simulated Contact Forces in the Triquetrum-Hamate Joint Driven with Subject Specific In-Vivo Kinematics** Rainbow M, Schwartz J, Kamal R, Akelman E, Crisco J *Brown University*	**Kinematic Gait Deviations, Center of Mass Power, and the Metabolic Demands of Gait for Individuals with Cerebral Palsy** Schwartz M, Rozumalski A, van der Krogt M *University of Minnesota-Twin Cities*
10:00	**The Capsule's Contribution to Total Hip Construct Stability -- a Finite Element Analysis** Elkins J, Rudert M, Tochigi Y, Pedersen D, Ellis B, Callaghan J, Weiss J, Brown T *University of Iowa*	**3D in Vivo Cervical Spine Kinematics: Preliminary Comparison of Fusion Patients and Control Subjects** McDonald C, Chang V, Bachison C, Bartol S, Bey M *Henry Ford Hospital*	**Stair Climbing Adaptations to Reduce Quadriceps Demand in Patients with Knee Osteoarthritis Are Not Associated with Pain** Asay J, Boyer K, Andriacchi T *Department of Veterans Affairs Bone and Joint Center*
10:15	**Development and Validation of a Finite Element Model of the Superior Glenoid Labrum** Gatti C, Maratt J, Palmer M, Hughes R, Carpenter J *University of Michigan*	**In Vitro Description of Foot Bony Motion Using a Cadaveric Robotic Gait Simulator** Whittaker E, Aubin P, Ledoux W *Veterans Health Administration Rehabilitation Research and Development Center of Excellence for Limb Loss Prevention and Prosthetic Engineering*	**Decreased Complexity in Leg Motion Patterns During Walking in Knee Osteoarthritis** Tochigi Y, Segal N, Vaseenon T, Brown T *University of Iowa*
10:30	**A Comparison of the Performance of Hexahedral and Tetrahedral Elements in Bone-Soft Tissue Finite Element Models** Tadepalli S, Erdemir A, Sett S, Cavanagh P *University of Washington*	**In Vivo Load-Relaxation of the Trunk with Prolonged Flexion** Toosizadeh N, Bazrgari B, Hendershot B, Muslim K, Nussbaum M *Virginia Polytechnic Institute and State University*	**Use of Neuromechanical Redundancy for Locomotor Compensation in Able-Bodied and Transtibial Amputee Subjects** Herrin K, Toney M, Chang Y *Georgia Institute of Technology*
10:45	**A Three-Dimensional Inverse Finite Element Analysis of the Heel Pad** Chokhandre S, Halloran J, Sirimamilla A, van den Bogert A, Erdemir A *Cleveland Clinic*	**Division of Labor Among Limbs and Joints of the Cat During Level and Slope Walking** Klishko A, Hodson-Tole E, Prilutsky B *Georgia Institute of Technology*	**Center of Rotation Position in Non-Articulated Prosthetic Feet: Implications for Prosthetic Foot Kinetics** Sawers A, Hahn M *University of Washington*

Podium Sessions

Saturday, August 21, 8:00–9:15 am

	Hall C	Hall A	Hall E
	Imaging	**Sports**	**Locomotion Energetics**
Session chairs	Frances T. Sheehan, PhD *National Institutes of Health* Amy Silder, PhD *Stanford University*	Kris O'Connor, PhD *University of Wisconsin-Milwaukee* Rick Hinrichs, PhD *Arizona State University*	Craig McGowan, PhD *University of Idaho* Carrie Peterson *University of Texas at Austin*
8:00	**Contact Differences Between Medial and Lateral Tibial Plateau Compartments Accompany Weight-Bearing** Dubowsky S, Allen J, Gade V, Barrance P *Kessler Foundation Research Center*	**Longitudinal Increases in Knee Abduction Moments During Maturation** Hewett T, Myer G, Ford K *Cincinnati Children's Hospital Medical Center*	**Metabolic Energy and Muscle Activity Required for Normal, Exoskeletal, and Added Weight Hopping** Grabowski A, Briner H, Shields B, Herr H *Massachusetts Institute of Technology*
8:15	**Altered Knee Arthrokinematics After Medial Meniscus Root Tear** Tashman S, Martin D, Antonino M, Harner C *University of Pittsburgh*	**Home-Based Instructional Program to Reduce Biomechanical Risk Factors for Knee Injury** Milner C, Tate J, Westlake C, Zhang S, Fairbrother J *University of Tennessee*	**Mechanics and Energetics of Human Hopping with a Passive-Elastic Ankle Exoskeleton** Sawicki G, Farris D *North Carolina State University and University of North Carolina at Chapel Hill*
8:30	**Combining Registration with Cine-PC Data in Order to Create Accurately Animated Subject-Specific Knee Joint Models.** Sipprell W, Borotikar B, Gavelli F *National Institutes of Health*	**Whole Body Biomechanical Modifications During Landings with a Secondary Horizontal Momentum Redirection Task** Held L, McNitt-Gray J, Flashner H *University of Southern California*	**Pendular Dynamics Applied to Obese Gait** Russel E, Hamill J *University of Massachusetts Amherst*
8:45	**Effect of Initial Manual Registration on the Final Results of Image Registration on Kinematics and Contact Analyses in the Radiolunate Joint** Johnson J, Fischer K *University of Kansas*	**Alterations in Knee Laxity During the Menstrual Cycle Change Muscle Activation Patterns During Selected Athletic Movements** Park S, Stefanyshyn D, Fukuchi C, Küpper J *University of Calgary*	**Walking Downhill: The Trade-Off Between Energetics and Stability** Hendrix E, Hunter L, Dean J *Medical University of South Carolina*
9:00	**Activation and Aponeurosis Width Affect Measured Strain in the Biceps Femoris Muscle** Fiorentino N, Rehorn M, Handsfield G, Epstein F, Blemker S *University of Virginia*	**Do Impacts Cause Running Injuries? A Prospective Study** Davis I, Bowser B, Mullineaux D *University of Delaware*	**Effect of Rigid Shoe Shape on Energetic Cost of Human Walking** Adamczyk P, Kuo A *Intelligent Prosthetic Systems, LLC*

Podium Sessions

Saturday, August 21, 9:30–10:45 am

	Hall C	Hall A	Hall E
	Upper Extremity	**Awards Session**	**Posture and Balance**
Session chairs	Katherine Saul, PhD *Wake Forest University* Jason J. Kutch, Ph.D. *University of Southern California*	Irene Davis, PhD, PT *University of Delaware*	Kimberly Edginton Bigelow, PhD *University of Dayton* Angela DiDomenico, Ph.D. *Liberty Mutual Research Institute for Safety*
9:30	Glenohumeral Muscle Forces During Wheelchair Activities Morrow M, Kaufman K, An K *Mayo Clinic*	*Journal of Biomechanics Award Finalist* The Mechanical Properties of the Endomysium Affect Propensity for Muscle Fiber Injury Near the Myotendinous Junction Sharafi B, Blemker S *University of Virginia*	Adaptation and Form of the Unconstrained Lateral Compensatory Stepping Response Hurt C, Earnest L, Grabiner M *University of Illinois at Chicago*
9:45	Muscle Function During the Push Phase of Wheelchair Propulsion Rankin J, Kwarciak A, Richter W, Neptune R *University of Texas at Austin*	*Journal of Biomechanics Award Finalist* How Do Step Width and Arm Swing Affect Energetic Cost and Lateral Balance During Running? Arellano C, Kram R *University of Colorado at Boulder*	A Musculoskeletal Model of Postural Control: Simulated Aging of Muscle Mechanical Properties Hasson C, van Emmerik R, Caldwell G *Northeastern University*
10:00	Relationship Between Clinical Measurements of Shoulder Motion and Strength and Baseball Pitching Mechanics Hurd W, Morrey B, Kaufman K *Mayo Clinic*	*Clinical Biomechanics Award Finalist* Patients with Patellofemoral Pain Exhibit Elevated Bone Metabolic Activity at the Patellofemoral Joint Draper C, Besier T, Fredericson M, Beaupre G, Delp S, Quon A, Gold G *Stanford University*	The Effects of an Unexpected Stance Foot Inversion Perturbation and Neuromuscular Loop Delay on Next Step Width in Healthy Adults Kim H, DeMott T, Strauss R, Richardson J, Ashton-Miller J *University of Michigan*
10:15	Net Torques Vary Across MCP Joints During a Text Typing Task Asundi K, Dennerlein J *Harvard University*	*Clinical Biomechanics Award Finalist* Virtual Pre-Operative Reconstruction Planning for Comminuted Articular Fractures Thomas T, Anderson D, Willis A, Marsh J, Brown T *University of Iowa*	Properties of Step Initiation in Parkinson's Disease Suggest Different Involvement of Saggital and Frontal Preparatory Movements Yungher D, Creath R, Rogers M *University of Maryland, College Park*
10:30	Evaluating the Importance of Including the Carpometacarpal Joints When Modeling the Hand Buffi J, Murray W *Northwestern University*		Perturbation-Based Balance Training in Older Adults at Increased Risk for Falls Bieryla K, Madigan M *Bucknell University*

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Clinical

1 **Development of Motorized Facilitated Ankle Stretching**
Gao F
UT Southwestern Medical Center at Dallas

3 **Ipsilateral and Contralateral Reaching in Persons with Chronic Stroke**
Finley M, Combs S
University of Indianapolis

5 **The Use of a Flexible, Non-Heel and Inexpensive Footwear Decreases Knee Loads in Elderly Women with Osteoarthritis**
Trombini-Souza F, Kimura A, Butsugan M, Ribeiro A, Aoki P, Passaro A, Arnone A, Sacco I
University of Sao Paulo

7 **Differences in Muscle Activation, Joint Kinematics and Kinetics During a Step Compared to Elliptical Exercise Pattern while Using the Precor AMT Trainer**
Rogatzki M, Kernozek T, Willson J, Greany J, Hong D, Porcari J
University of Wisconsin-La Crosse

9 **Perturbation Training Improves Gait Patterns in ACL Deficient Females**
Di Stasi S, Snyder-Mackler L
University of Delaware

11 **Biomechanical and Gait Improvements After Passive Stretching and Active Movement Training in Children with Cerebral Palsy**
Wu Y, Hwang M, Ren Y, Gaebler-Spira D, Zhang L
Rehabilitation Institute of Chicago

13 **The Influence of a Neuromuscular Training Program on Landing Mechanics while Fatigued**
Greska E, Cortes N, Ringleb S, Onate J
Old Dominion University

15 **Simulation Detects Changes in Muscle Activation in Post-Stroke Gait After a Functional Electrical Stimulation Intervention**
Knarr B, Kesar T, Helm E, Reisman D, Binder-Macleod S, Higginson J
University of Delaware

17 **Effects of Continuous Passive Motion on Lower Extremity Hypertonia in Children with Cerebral Palsy**
Cheng H, Ju Y, Guan P
Chang-Gung University

Friday, August 20, 4:30–6:00 pm

Clinical

2 **Feasibility of Group Kickboxing to Improve Balance and Gait in Patients with Multiple Sclerosis**
Jackson K, Bigelow K
University of Dayton

4 **Quantitative Examination of Core Muscle Activation During Isometric Exercises**
Oliver G, Stone A, Plummer H, Keeley D
University of Arkansas

6 **Examining the Dose Response Relation for Neuromuscular Electrical Stimulation and Recovery Following Total Knee Arthroplasty**
Marmon A, Petterson S, Snyder-Mackler L
University of Delaware

8 **Comparative Gait Analysis of Ankle Arthrodesis and Arthroplasty: Initial Results of a Prospective Study**
Hahn M, Wright E, Segal A, Orendurff M, Ledoux W, Sangeorzan B
Veterans Health Administration Rehabilitation Research and Development Center of Excellence

10 **Improvement in Off-Axis Neuromuscular Control During Functional Tasks Following Six-Week of Pivoting Elliptical Training**
Lee S, Ren Y, Geiger F, Chang A, Press J, Zhang L
Northwestern University

12 **Stroke Rehabilitation: A Kinematic Analysis of Device-Assisted and Clinician-Assisted Sit-To-Stand Transfers**
Hueftle A, Balogh B, Taylor A, Goldman A, Buster T, Burnfield J
Madonna Rehabilitation Hospital

14 **Lateral Wedges Reduce Medial Knee Loading in Asymptomatic, Obese Women**
Russel E, Hamill J
University of Massachusetts Amherst

16 **Deficits in the Heel-Rise Test in Patients with Achilles Tendon Rupture Can Be Explained by Tendon Elongation and Muscular Weakness**
Silbernagel K, Manal K
University of Delaware

18 **Altered Inter-Joint Coordination During Walking in Patients with Total Hip Arthroplasty**
Chiu S, Chou L
University of Oregon

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Clinical continued

19 **Kinematic Analysis of Five Cardiovascular Exercises**
Buster T, Taylor A, Frazier M, Burnfield J
Madonna Rehabilitation Hospital

21 **Neuro-Mechanical and Clinical Outcome of Stroke Rehabilitation of Ankle Impairments Through Passive Stretching and Active Movement Training**
Waldman G, Wu Y, Ren Y, Li Y, Wang L, Guo X, Roth E, Zhang L
Northwestern University

23 **The Impact of Stochastic Resonance Electrical Stimulation and Knee Sleeve on Impulsive Loading During Gait in Knee Osteoarthritis**
Collins A, Blackburn J, Olcott C, Jordan J, Grewal B, Yu B, Weinhold P
University of North Carolina at Chapel Hill

25 **Efficacy of Gait Training with Real-Time Biofeedback in Correcting Knee Hyperextension Patterns in Young Women**
Teran-Yengle P, Singh B, Yack H
University of Iowa

27 **Trunk Movement in Manual Wheelchair Propulsion in Various Overground Conditions**
Worobey L, Koontz A, Boninger M
University of Pittsburgh

29 **A Reward System for Altering Distribution of Effort in Multi-Limb Exercise**
Skinner N, Ferris D, Kuo A
University of Michigan

31 **Variability of Clinical Examination Techniques Used to Assess Laxity of the Anterior Cruciate Ligament**
Jacobs C, Branch T, Siebold R
ERMI, Inc.

33 **The Effect of Foot Type on Plantar Loading**
Kraszewski A, Chow B, Frey J, Lenhoff M, Backus S, Deland J, Demp P, Song J, Heilman B, Rajan S, Woodley A, Hillstrom H
Hospital For Special Surgery

Friday, August 20, 4:30–6:00 pm

Clinical continued

20 **Is Ankle Instability a Central Or Peripheral Issue?**
Gutierrez G, Kaminski T
New York University

22 **Do Those with Perceived Ankle Instability Have Associated Mechanical Instability?**
Liu K, Gustavsen G, Kaminski T
University of Delaware

24 **Comparison of Lower Extremity Electromyographic (EMG) Demands During ICARE Training and Walking**
Burnfield J, Shu Y, Buster T, Taylor A, Merriman L
Madonna Rehabilitation Hospital

26 **Compensatory Movement Strategies Among Subjects with Hip Fracture During a Sit to Stand Task**
Kneiss J, Bukata S, Puzas J, Houck J
University of Rochester Medical Center

28 **Step Length Variability During Gait Initiation in Parkinson's Disease**
Roemmich R, Nocera J, Vallabhajosula S, Amano S, Hoover B, Hass C
University of Florida

30 **Abdomen-Thigh Contact Forces During Functional Reaching Tasks in Obese Individuals**
Singh B, Brown T, Callaghan J, Yack J
University of Iowa

32 **The Use of the EMG Integral and Kinematic Analysis for Evaluation of Spastic Hemiplegic Patients**
Silva C, Vanderlei F, Carvalho A, Kuriki H, Polito L
University Estatual Paulista

34 **Abstract Withdrawn**

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Comparative

35 Computational Modeling of Ardipithecus Ramidus: A Revolution in Evolution
McGuan S
LifeModeler,Inc.

37 Study of Propulsion Mechanisms in Leech Anguilliform Swimming
Chen J, Iwasaki T, Friesen W
University of Virginia

39 Kinematic Modeling of the Seahorse Tail
Praet T, Van Cauter S, Adriaens D, Kannan S, Masschaele B, Srigiriraju S, De Beule M, Verhegge B
Ghent University

41 Finite Element Simulation of a Porcine Temporomandibular Joint
Dalne S, Sindelar B, Cotton J
Ohio University

43 The Effects of Differential Wing Stroke Amplitude and Stroke Offset on Insect Body Moments During Perturbed Flight Conditions
Vance J, Faruque I, Humbert J
University of Maryland, College Park

Computational Modeling

45 Computed-Tomography-Based Finite-Element Models of Long Bones Can Accurately Capture Strain Response to Bending and Torison
Varghese B, Hangartner T
Wright State University

47 Bone Fracture Analysis Using the Extended Finite Element Method (XFEM) with ABAQUS
Liu X, Qin X, Du Z
Dassault Systemes Simulia Corp

49 Using Subject-Specific Muscle Parameters to Compare Muscle Forces Between an EMG-Driven and OPENSIM Musculoskeletal Model
Olchowski D, Buchanan T, Higginson J
University of Delaware

51 Development of a Three-Dimensional Finite Element Model of the Hand and Wrist
Gong M, Oliver M, Dony R, Semechko A
University of Guelph

Friday, August 20, 4:30–6:00 pm

Comparative

36 Skeletal Muscle Architecture of the Goat Hindlimb
Arnold A, Eng C, Biewener A
Harvard University

38 Study of Motor Control of Leech Anguilliform Swimming
Chen J, Friesen W, Iwasaki T
University of Virginia

40 Animal-Robot Interaction Forces As a Measure of Locomotor Function Following Spinal Cord Injury
Nessler J, Duhon J, Keller R, Thys T
California State University, San Marcos

42 Functional Morphology of Dorsal Fins in Two Shark Species
Maia A, Wilga C
University of Rhode Island

44 A Biomedical Perspective on Variation in the Human Clavicle, with Particular Reference to LB1 from Flores, Indonesia
Eckhardt R, Weller A
Pennsylvania State University

Computational Modeling

46 Development of a Hybrid Model Simulating the Vibration Characteristics of a Human Hand-Finger System
Wu J, Dong R, Xu Y, Welcome D
National Institute for Occupational Safety and Health

48 Testing and Modeling the Nonlinear Behavior of UHMWPE Used in Orthopaedic Implants
Gomaa S, Leisinger S
DePuy Orthopaedics, Inc.

50 Equivalence of Elastic Contact and Finite Element Models of Patient-Specific Contact Stress Exposure in the Human Ankle
Kern A, Anderson D, Brown T
University of Iowa

52 Sensitivity of Strains in the Femoral Neck to Variations in Muscle Forces
Anderson D, Madigan M
Virginia Polytechnic Institute and State University

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Computational Modeling continued

53 **Influence of In-Vivo Tendon Force-Strain Relationship for Different Loading Rates into EMG-Driven Model**
Gerus P, Rao G, Manal K, Buchanan T, Berton E
Aix-Marseille University

55 **Abstract Withdrawn**

57 **Dynamic Simulation of Movement Based on OPENSIM and Matlab/Simulink**
Mansouri M, Reinbolt J
University of Tennessee

59 **Simulation of Subject-Specific Bone Remodeling**
Sonar A, Issen K, Kuxhaus L, Carroll J
Clarkson University

61 **Unique Representations to Analyze Three Dimensional Movements**
Vrongistinos K, Jung T, Wee S, Costello T, Hwang Y, Stylianides G
California State University, Northridge

63 **Small Chest Impactors at High Accelerations: Assessing Thorax Injury Potential from a Finite Element Model**
Danelson K, Bolte J, Stitzel J
Wake Forest University

65 **Reliable Finite Element Modeling of Osteoporotic Bone Augmentation**
Basafa E, Armiger R, Kutzer M, Sutter E, Mears S, Belkoff S, Armand M
Johns Hopkins University

67 **Biodynamic Modeling of Stair-Ascent by PCL-Deficient Patients**
Li K, Tashman S, Harner C, Zhang X
University of Pittsburgh

Friday, August 20, 4:30–6:00 pm

Computational Modeling continued

54 **Peak Contact Stress in Human Hip Joint - Biomechanics Or Mechanobiology?**
Daniel M, Hornova J, Iglic A
Czech Technical University in Prague

56 **On the Role of Lipid Anisotropy in the Transition Between Lamellar and Inverted Hexagonal Lipid Phases**
Perutkova S, Daniel M, Iglic A, Kralj-Iglic V
Czech Technical University in Prague

58 **Finite Element Modeling of Intraneural Ganglion Cysts of the Common Peroneal Nerve**
Elangovan S, Odegard G, Morrow D, Wang H, Hebert-Blouin M, Spinner R
Michigan Technological University

60 **Subject-Specific, Group-Mean, and Generic Musculoskeletal Models for Predicting Isometric Ankle Dorsiflexion Torque**
LaBoda M, Gidley A, Hasson C, Caldwell G, Umberger B
University of Massachusetts Amherst

62 **Evaluation of Stepping Task Biomechanics Using OPENSIM**
Malineni S, King G
University of Missouri - Kansas City

64 **A Complete, Universal, and Verifiable Set of Upper Body Segment Parameters for Three-Dimensional Dynamic Modeling**
Vette A, Yoshida T, Thrasher A, Masani K, Popovic M
University of Toronto

66 **Sensitivity of Predicted Peak Isometric Ankle Dorsiflexion Torque to Musculoskeletal Model Parameter Values**
Gidley A, Laboda M, Umberger B
University of Massachusetts Amherst

68 **Accuracy of Bone and Cartilage Models Obtained from CT and MRI**
Thorhauer E, Miyawaki M, Illingworth K, Holmes J, Anderst B
University of Pittsburgh

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Ergonomics

69 **Grip Surface Friction Affects Maximum Tip Pinch Force**
Engel A, Enders L, Keenan K, Seo N
University of Wisconsin-Milwaukee

71 **The Box and Block Test Score is Dependent Upon Block Surface**
Cary D, Enders L, Seo N
University of Wisconsin-Milwaukee

73 **Correlation Between Guided Grip Force and Perceived Exertion for Males**
Li K
Chung Hua University

75 **A Flexed Wrist Results in Larger Muscle Stresses During Tapping**
Chen H, Asundi K, Dennerlein J
Harvard University

77 **Joint Contribution to Fingertip Movement During Directional Tapping**
Qin J, Trudeau M, Dennerlein J
Harvard University

79 **Assessment of Arm Dynamics in Experienced Workers while Operating Right-Angle Torque Tools**
Ay H, Sommerich C, Luscher A, Gumpina R
Ohio State University

81 **Verbal Estimation of Peak Dynamic Hand Forces in Experienced and Novice Manual Material Handlers**
Andrews D, Phillips A, Weir P
University of Windsor

83 **Individual Determinants of Stability During Lifting**
Lussier B, Delisle A, Berrigan F, Plamondon A
University of Sherbrooke

Gait

85 **Center of Mass Power Profiles for Individuals with Cerebral Palsy**
Schwartz M, Rozumalski A
University of Minnesota-Twin Cities

87 **Can a Novel Virtual Environment Mobility Platform Replicate the Biomechanical and Physiological Effects of Overground Walking?**
Boynton A, Kehring K, White T
U.S. Army Research Laboratory

Friday, August 20, 4:30–6:00 pm

Ergonomics

70 **Slip-Resistance and Abrasion of New & Used Shoe Soles**
Li K
Chung Hua University

72 **Hand Support Reduces Peak L5/S1 Moments in One-Handed Lifting**
Faber G, Kingma I, van Dieën J
VU University, Amsterdam

74 **Vibration Frequency Influences Foot to Leg Transmission**
Smith G, Bressel E, Nash D
Utah State University

76 **Acute Biomechanical Responses to a Prolonged Standing Exposure: Implications for Job Rotation Design**
Nelson-Wong E, Howarth S, Callaghan J
Regis University

78 **Biodynamic Modeling and Physical Capacity Assessment of Human Arm Response in Experienced Torque Tool Operators**
Ay H, Sommerich C, Luscher A, Gumpina R
Ohio State University

80 **Thumb Motor Performance Varies by Movement Orientation and Direction During Mobile Phone Use**
Trudeau M, Udtamadilok T, Dennerlein J
Harvard University

82 **Pressure on the Knee while Performing a Lateral Lift from Kneeling Postures**
Mayton A, Pollard J, Porter W, Moore S
National Institute for Occupational Safety and Health

84 **Quantification of Dynamic Human Seated Spinal Curvatures**
Leitkam S, Bush T
Michigan State University

Gait

86 **Habituation to Galvanic Vestibular Stimulation During Gait**
Roche J, Steed D, Redfern M
University of Pittsburgh

88 **Asymmetry, Limb Dominance and Foot Orientation During Walking Gait**
Polk J, Rosengren K
University of Illinois at Urbana-Champaign

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Gait continued

89 **Joint Powers Are Affected by Age and Peripheral Arterial Disease.**
Koutakis P, Myers S, Pipinos I, Johanning J, Stergiou N
University of Nebraska at Omaha

91 **Effects of Load Carriage on Foot Anthropometrics**
Goffar S, Reber R, Christiansen B, Miller R, Naylor J, Rodriguez B, Walker M, Teyhen D
U.S. Army-Baylor University

93 **Frontal Plane Kinetics and EMG Activity During Stair Ambulation**
Hall M, Stevermer C, Gillette J
Iowa State University

95 **Biomechanics of Uphill Walking in Moderately Obese Adults**
Reynolds M, Ehlen K, Dannecker K, Carter C, Browning R
Colorado State University

97 **Vascular Occlusion Affects Gait Variability Patterns of Healthy Younger and Older Individuals**
Myers S, Johanning J, Pipinos I, Stergiou N
University of Nebraska at Omaha

99 **Dynamic Stability of a 3D Dynamic Walking Model with Simulated Neuronal Noise**
Roos P, Dingwell J
University of Texas at Austin

101 **Neuromuscular Control Adaptation in Gait due to Injury: A Motivating Study Using a Simplified Dynamic Model**
DiBerardino L, Dankowicz H, Hsiao-Wecksler E
University of Illinois at Urbana-Champaign

103 **Increasing Paretic Leg Extension in Pre-Swing is Important for Increasing Forward Propulsion During Walking**
Peterson C, Kautz S, Neptune R
University of Texas at Austin

105 **Hip Joint Moments Using a Greater Trochanter Method of Locating the Hip Joint Center**
O'Connor K, Weinhandl J
University of Wisconsin-Milwaukee

107 **Dynamic Stability of Walking During Anterior-Posterior and Medio-Lateral Support Surface and Visual Field Translations**
McAndrew P, Dingwell J, Wilken J
University of Texas

Friday, August 20, 4:30–6:00 pm

Gait continued

90 **Effects of Handrail Use on Healthy Treadmill Walking**
Zahradka N, Reisman D, Higginson J
University of Delaware

92 **Reliability of Regional Plantar Pressure During Walking, Stair Ascent and Descent**
Chen Y, Lo O, Iannuzzi L, Mroczek K, Rao S
New York University

94 **Load Carriage Increases Mechanical Loading Rates During Walking**
Wang H, Frame J, Ozimek E, Reedstrom C, Leib D, Dugan E
Ball State University

96 **Human Ankle Mechanics During Able-Bodied and Pathological Gait**
Dutta A
Rehabilitation Institute of Chicago

98 **Gait After Unilateral Total Knee Arthroplasty: Frontal Plane Analysis**
Alnahdi A, Zeni J, McGinnis K, Snyder-Mackler L
University of Delaware

100 **The Effect of Foot Type on Temporal-Distance Gait Parameters in Healthy Individuals**
Frey J, Zifchock R, Chow S, Kraszewski A, Patel V, Lenhoff M, Backus S, Deland J, Demp P, Song J, Heilman B, Rajan S, Woodley A, Hillstrom H
Hospital for Special Surgery

102 **Effect of a Supervised Hip Flexor-Stretching Program on Gait in Healthy Elders**
Watt J, Jackson K, Franz J, Dicharry J, Della Croce U, Kerrigan D
University of Virginia

104 **Braking and Propulsive Impulses Positively Relate to Walking Speed During Accelerated and Decelerated Walking**
Peterson C, Kautz S, Neptune R
University of Texas at Austin

106 **A Passive-Elastic Ankle Exoskeleton Using Controlled Energy Storage and Release**
Wiggin B, Collins S, Sawicki G
North Carolina State University and University of North *Carolina at Chapel Hill*

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Gait continued

109 The Effect of Various Thong Flip-Flops on Gait Kinetics
Shroyer J, Weimar W
University of Louisiana at Lafayette

111 Over-Striding During Fixed-Cadence Load Carriage Leads to Increased Ground Reaction Forces
Gutekunst D, Frykman P, Seay J
Washington University

113 Human Postural Model That Captures Rotational Inertia
Dutta A, Goswami A
Rehabilitation Institute of Chicago

115 Gait Biomechanics in Hip Arthroplasty Patients and Control Subjects: Effect of Big Femoral Head and Surface Replacement Protheses
Bouffard V, Nantel J, Therrien M, Vendittoli P, Lavigne M, Prince F
Université de Montréal

117 Foot Forces During Exercise on the International Space Station
Genc K, Gopalakrishnan R, Kuklis M, Maender C, Rice A, Bowersox K, Cavanagh P
University of Washington

119 Assessing Performance of Three Types of Biomechanical Models Applied to Normal Human Gait
Buczek F, Rainbow M, Cooney K, Bruening D, Schmitz A, Thelen D
National Institute for Occupational Safety and Health

121 Temporal & Spatial Gait Characteristics During Prolonged Exposure to a Normal Surface in Workboots
Garner J, Wade C
Auburn University

123 Gravitational Impulse Model Predicts Collision Dynamics During Gait
Yeom J, Park S
Korea Advanced Institute of Science and Technology

125 Fifteen Observations on the Structure of Optimal Gaits for Various Simple Bipedal Models
Srinivasan M
Ohio State University

Friday, August 20, 4:30–6:00 pm

Gait continued

108 Walking on an Oscillating Treadmill: Two Paths to Functional Adaptation
Brady R, Peters B, Bloomberg J
Wyle Integrated Science and Engineering Group

110 The Effect of Sustained Static Kneeling on Knee Joint Gait Parameters
Kajaks T, Costigan P
McMaster University

112 Changes in Gait Kinematics at Preferred Walking Speed in People with Multiple Sclerosis
Busa M, Jones S, Remelius J, House J, Sugumaran K, Eve J, Van Emmerik R
University of Massachusetts Amherst

114 Symmetry of Plantar Pressure During Self-Selected Walking, Fast Walking, Heel Raise and Sit-To-Stand Activities
Lo O, Iannuzzi L, Mroczek K, Rao S
New York University

116 Limb Kinematics Predict Emotion Recognition with Walking Speed Modifications in Biomechanical Animations
Gross M, D'Angelo J
University of Michigan

118 Assessing Spatiotemporally Complex and Coupled Gait Patterns Using Temporal Cross-Correlation
Park K, Dankowicz H, Hsiao-Wecksler E
University of Illinois at Urbana-Champaign

120 A Limb Suspension Model to Describe Leg Stiffness Change with Gait Speed
Kim S, Park S
Korea Advanced Institute of Science and Technology

122 Ankle & Knee Musculature Co-Contraction Following Extended Durations of Walking in Workboots
Wade C, Garner J
Auburn University

124 The Effect of Heel Height on Peak Tibial and Head Accelerations and Shock Attenuation During Walking
Barkema D, Derrick T, Martin P
Iowa State University

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Gait continued

127 Ground Reaction Forces Scale to Ramp Angle During Transitions
Sheehan R, Gottschall J
Pennsylvania State University

129 The Effect of Foot Type of Normal Subjects on Foot Contact Dynamics
Mootanah R, Frey J, Zifchock R, Chow S, Kraszewski A, Lenhoff M, Backus S, Deland J, Demp P, Song J, Hillstrom H
Anglia Ruskin University

131 The Effects of a Downhill Grade on the Biomechanics of Walking in Obese Adults
Dannecker K, Ehlen K, Reynolds M, Browning R
Colorado State University

133 Multi-Segment Foot Model Kinetics During Normal Gait
Bruening D, Cooney K, Buczek F
Shriners Hospitals for Children - Erie

Lower Extremity

135 Three-Dimensional Position Capture of the Lower Extremity Mechanical Axis Correlates Significantly with Radiographical Measurement in Patients with Knee OA
Foxworth J, Renner J
Winston Salem State University

137 Comparison of Bilateral Kinematics and Kinetics During Sit-To-Stand and Stand-To-Sit Between Healthy Subjects and Unilateral Knee Osteoarthritis Patients
Burnett D, Campbell-Kyureghyan N, Topp R, Quesada P
University of Louisville

139 The Influence of Patella Cartilage Thickness on Patella Bone Stress in Females with and Without Patellofemoral Pain
Ho K, Yang N, Farrokhi S, Powers C
University of Southern California

141 Preferred Frequency During a Simple Bouncing Task
Merritt K, Raburn C, Dean J
Medical University of South Carolina

Friday, August 20, 4:30–6:00 pm

Gait continued

126 Joint Contact Force Comparisons Between Healthy Subjects and Those with Medial Compartment Knee Ostearthritis
Manal K, Kumar D, Buchanan T, Rudolph K
University of Delaware

128 Discrete Frequency Adjustment of Walking Above and Below Preferred Stride Frequency Causes an Increase in the Metabolic Cost of the Movement
O'Halloran J, Remelius J, van Emmerik R, Hamill J
University of Massachusetts Amherst

130 Natural Ankle Pseudo-Stiffness During Gait Initiation
Guinn L, Takahashi K, Razzook A, Stanhope S
University of Delaware

132 Collision Compensation by Active Push-Off with Gait Speed
Park H, Yeom J, Park S
Korea Advanced Institute of Science and Technology

134 People Walking on Treadmills Control Speed, Not Position
Cusumano J, John J, Dingwell J
Pennsylvania State University

Lower Extremity

136 A Comparison of Experimental and Simulated Patellofemoral Contact Mechanics Before and After Trochlear Osteotomy
Bennetts C, Fening S, Colbrunn R, Andrish J, Erdemir A
Cleveland Clinic

138 Increase Patellofemoral Joint Stress with Internal Femoral Rotation: A Finite Element Analysis
Yang N, Ho K, Farrokhi S, Powers C
University of Southern California

140 Curve Inflection and Modification of the Anterior Knee Laxity Compliance Index: Specific Variables to Assess Anterior Cruciate Ligament Integrity
Wordeman S, Paterno M, Quatman C, Bates N, Hewett T
University of Cincinnati

142 Minimizing Variability of Anterior Tibial Translation Measures Duirng Knee Laxity Testing
Jacobs C, Branch T, Browne J, Campbell J
ERMI, Inc.

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Lower Extremity continued

143 Does Quadriceps Moment Arm Dysfunction Exist in Cerebral Palsy?
Sheehan F, Behnam A, Alter K
National Institutes of Health

145 Drop Landings in Military Boots
Oliver G, Booker J, Stone A, Plummer H
University of Arkansas

147 Tibial Acceleration and Slope Contributions to ACL Loading During a Simulated Landing Impact
McLean S, Oh Y, Palmer M, Ashton-Miller J, Wojtys E
University of Michigan

149 The Effects of Single-Leg Landing Technique on ACL Loading
Laughlin W, Weinhandl J, Kernozek T, O'Connor K
University of Wisconsin-Milwaukee

151 Examining the Kinematics of the Knee During a Side Step Cutting Task Using the Helical Axis Method
Samaan M, Ringleb S, Choisne J, Bawab S, Cortes N, Greska E, Onate J
Old Dominion University

153 Biomechanical Analysis of Stepping Down in Continuous Gait Following Ankle Evertor Fatigue: A Pilot Study
Pozzi F, Gutierrez G, Moffat M
New York University

155 Lower Extremity Kinematic Sequence During the Single Leg Hop Test Following ACL Reconstruction
Orishimo K, McHugh M, Kremenic I, Mullaney M, Nicholas S
Nicholas Institute of Sports Medicine and Athletic Trauma

157 Effect of Impulsive Transverse Plane Tibial Torques and Frontal Plane Moments on in Vitro ACL Relative Strain During a Simulated Jump Landing
Oh Y, Lipps D, Ashton-Miller J, Wojtys E
University of Michigan

Friday, August 20, 4:30–6:00 pm

Lower Extremity continued

144 Estimation of Anterior Tibial Translation and Ligament Loading in Healthy and ACL-Deficient Knees During Walking
Shao Q, MacLeod T, Manal K, Buchanan T
University of Delaware

146 A Line Profile Approach to Quantify PTOA Using T1rho MRI
Klocke N, Thedens D, Martin J, Amendola A, Brown T
University of Iowa

148 Load Response of Articular Cartilage and Ligaments to Valgus Loading: A Fibril-Reinforced Model of the Knee
Kazemi M, Gu K, Li L
University of Calgary

150 Predicting Knee Valgus During Landing from a Jump from a Field Test in a Fatigued Condition
Afifi M, Hinrichs R
University of Calgary

152 Dynamic Knee Joint Stiffness and Knee Joint Moments After Unilateral TKA
McGinnis K, Zeni J, Alnahdi A, Snyder-Mackler L
University of Delaware

154 Ankle Actuator Deficits in the Presence of Achilles Tendinopathy
Chang Y, Siemienski A, Gregor R, Kulig K
University of Southern California

156 A Comparison of Maximal Knee Moments Generated During Single Joint Knee Extension and Leg Press Tasks
Gordon M, Schulz B, Ashton-Miller J
University of Michigan

158 Effects of Ankle Immobilization on Knee Joint Biomechanics During an Unanticipated Cutting Maneuver
Boros R, Plumlee E
Texas Tech University

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Methods

159 **Filtering GRF Data Affects the Calculation and Interpretation of Joint Kinetics and Energetics During Drop Landings**
McCaw S, Gardner J, Barlow L
Illinois State University

161 **Experimental and Modeling Investigation of SEMG Spike Analysis**
Gabriel D, Christie A, Inglis J, Kamen G
Brock University

163 **Variability of Gait Kinematic Data Associated to Observer and Marker Placement Technique**
Moniz-Pereira V, Carnide F, Agostinho R, Amado S, Veloso A
Technical University of Lisbon

165 **Longitudinally Assessed Change in Stature and Segment Length**
Ford K, Myer G, Shapiro R, van den Bogert A, Hewett T
Cincinnati Children's Hospital Medical Center

167 **Analysis of Gait Cycle Shapes Using Parallel Factor Analysis**
Helwig N, Hong S, Polk J, Lague M
University of Illinois at Urbana-Champaign

169 **Modeling Nonlinear Errors in Surface Electromyography due to Baseline Noise: A New Methodology**
Law L, Krishnan C, Avin K
University of Iowa

171 **Locating the Hip Joint Center Using a Greater Trochanter Method**
Weinhandl J, O'Connor K
University of Wisconsin-Milwaukee

173 **The Use of Dynamical Systems Theory Methods to Refine Kinematic Movement Data As an Input to an Artificial Neural Network**
O'Halloran J, Anderson R
University of Massachusetts Amherst

175 **Normalization of EMG Amplitude: A Comparison of Different Methods Used to Test Individuals with Arthritis of the Hand**
Calder K, Galea V, Wessel J, MacDermid J, MacIntyre N
McMaster University

Friday, August 20, 4:30–6:00 pm

Methods

160 **Effects of Experimental Setup and Modeling Assumptions on Predicted Trunk Properties Using a System Identification Method**
Bazrgari B, Nussbaum M, Madigan M
Virginia Polytechnic Institute and State University

162 **A Comparison of Vibration Acceleration Measured with High Speed 3-D Motion Capture and Triaxial Accelerometers**
Bressel E, Smith G, Nash D
Utah State University

164 **Is Subjects' Joint Torque Variability Related to Joint Torque Error?**
Riemer R
Ben-Gurion University of the Negev

166 **A Framework for Studying Underactuation in the Human Hand**
Balasubramanian R, M. Dollar A
Yale University

168 **Human Attribute Recognition from Optimized 2D Viewing Angle Simulation**
Bowden D, Santez D, Fullenkamp A, Campbell B
711th Human Performance Wing

170 **A Cadaveric Robotic Gait Simulator with Fuzzy Logic Vertical Ground Reaction Force Control**
Aubin P, Whittaker E, Ledoux W
Veterans Health Administration Rehabilitation Research and Development Center of Excellence for Limb Loss Prevention and Prosthetic Engineering

172 **Effect of Scientist Experience on the Repeatability of Palpation of Scapular Landmarks**
Hooke A, Kaufman K, An K
Mayo Clinic

174 **Can Hip and Knee Kinematics Be Improved by Eliminating Thigh Markers?**
Schulz B, Kimmel W
Veterans Health Administration Health Services Research and Development Center of Excellence

176 **Soft Tissue Artifact Has Inter-Subject and Inter-Motor-Task Similarities: A New Concept for Its Compensation**
Gao B, Banks S, Zheng N
University of Florida

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Methods continued

177 **Evaluation of an Inertial and Magnetic Measuring System As a Method of Collecting Kinematics of Wheelchair Propulsion**
Daigle S, Rampurawala Z, Hsiao-Wecksler E, Sosnoff J
University of Illinois at Urbana-Champaign

179 **Estimation of Stride Variability from Foot-Mounted Inertial Sensors**
Rebula J, Kuo A
University of Michigan

181 **New Approach to Characterize Trunk Neuromuscular Responses During Rapid Voluntary Extremity Movement**
Mehta R, Cannella M, Wattananon P, Henry S, Silfies S
Drexel University

Motor Control

183 **Stabilization of the Total Force in Multi-Finger Pressing Tasks Studied with the 'inverse Piano' Technique**
Martin J, Budgeon M, Zatsiorsky V, Latash M
Pennsylvania State University

185 **Computational Model to Predict the Effects of Cognitive and Neuromuscular Impairments on Driving**
Long B, Gillespie I, Tanaka M
Wake Forest University

187 **Planarity of Force Distribution in a 4-Finger Force Space During Multi-Finger Prehension and Its Implication for Inverse Optimization**
Niu X, Terekhov A, Latash M, Zatsiorsky V
Pennsylvania State University

189 **Trial-To-Trial Adaptation of Multi-Digit Forces to Texture for Object**
Zhang W, Gordon A, McIsaac T, Santello M
Arizona State University

191 **Exploiting Redundancy in Generalized Reaching Tasks**
Smallwood R, Dingwell J
University of Texas

193 **Multi-Finger Synergies During Isometric Force Production Task in Index Finger Amputees**
Karol S, Shim J
University of Maryland, College Park

Friday, August 20, 4:30–6:00 pm

Methods continued

178 **Reliability and Validity of Accelerometer-Based Smartphones to Assess Physical Activity**
Saha I, Dirik A, Topkara U, Memon N, Guitierrez G, Rao S
New York University

180 **Time Normalizing Gait Data Based on Gait Events**
Morris E, Hsiao-Wecksler E
University of Illinois at Urbana-Champaign

182 **A Kinematic Method for Strike Pattern Detection**
Altman A, Davis I
University of Delaware

Motor Control

184 **Prehension Synergy: Principle of Superposition During Multi-Finger Torque Production on Mechanically Fixed- and Free-Objects**
Park J, Zatsiorsky V, Kim Y, Kim Y, Shim J
Pennsylvania State University

186 **Trunk Segment Coordination During a Jumping Task in Elite Dancers: An Exploration Using Vector Coding**
Smith J, Siemienski A, Popovich J, Kulig K
University of Southern California

188 **Adaptive Changes in Finger Force Variance in Response to Index Finger Fatigue in a Multi-Finger Task**
Singh T, Zatsiorsky V, Latash M
Pennsylvania State University

190 **Nonlinear Smooth Orthogonal Decomposition Identifies Local Muscle Fatigue Dynamics in Sawing Motion**
Segala D, Gates D, Dingwell J, Chelidze D
University of Rhode Island

192 **Differences in Grip Characteristics Between Younger and Older Females**
Irwin C, Sesto M
University of Wisconsin-Madison

194 **Adaptations of Multi-Finger Interactions Through Fatigue Exercise**
Shim J, Huang J, Karol S, Kim Y, Yoon B
University of Maryland, College Park

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Motor Control continued

195 **Limitations to Synchronization of Coordinated Finger Movement**
Gu Y, Hiley M, Pain M
Loughborough University

197 **Variable Stiffness Shoe Alters Muscle Activations and Knee Joint Moments.**
Boyer K, Andriacchi T
Stanford University

199 **Directional Characteristics of Fingertip Force Production After Hemiparetic Stroke**
Towles J, Triandafilou K, Stoykov M, Kamper D
Rehabilitation R&D Service, Edward Hines Jr. VA Hospital

Muscle

201 **Dependence of Muscular Mass in the Origin of Inguinal Hernia**
Susín A, Herrera B, López-Cano M, Fortuny G
Universitat Rovira i Virgili

203 **Gastrocnemius Atrophies Preferentially in Post-Stroke Plantar Flexors**
Ramsay J, Buchanan T, Barrance P, Higginson J
University of Delaware

205 **Variability in Biceps Femoris Long Head Muscle-Tendon Morphology**
Handsfield G, Fiorentino N, Blemker S
University of Virginia

207 **A Unique Method of Measuring Dynamic Rate of Torque Development: Comparison of Explosive Power Athletes and Controls**
Tillin N, Pain M, Oguz H, Lewis G, Folland J
Loughborough University

209 **Variation in Muscle Model Output Using Cadaver-Specific Model Parameters**
Infantolino B, Challis J
Pennsylvania State University

211 **A 3D Model Demonstrates the Effects of Increased Activation on Nonuniform Strains in Muscle**
Rehorn M, Blemker S
University of Virginia

Friday, August 20, 4:30–6:00 pm

Motor Control continued

196 **Biomechanical Constraints on the Control of Endpoint Stiffness**
Hu X, Murray W, Perreault E
Northwestern University

198 **Interlimb Coordination for Force Control During Human Hopping**
Yen J, Chang Y
Georgia Institute of Technology

200 **Active Joint Position Sense: Effects of Elevation Angle, Arm Dominance and Proximal vs Distal Joints**
Hyler J, Harding E, Karduna A
University of Oregon

Muscle

202 **Characterization of Upper Limb Muscle Volume in Female Older Adult Subjects Following Resistance Exercise Training**
Vidt M, Daly M, Eggebeen J, Simpson W, Marsh A, Saul K
Virginia Tech–Wake Forest University School of Biomedical *Engineering and Sciences*

204 **Muscle Activity During Running Scales Non-Uniformly Across Phases of the Gait Cycle**
Silder A, Thelen D
Stanford University

206 **Active Force Enancement As a Source of SSC Enhancement**
Pain M, Buckeridge E, O'Brien T, Forrester S
Loughborough University

208 **Mechanical Maladaptations to Eccentric Exercise Result in Sustained Hypertrophic Signaling in Skeletal Muscle Cells**
Abshire S, Best T, Butterfield T
University of Kentucky

210 **Tracking Non-Contractile Material in Muscle**
Infantolino B, Hughes J, Neuberger T, Challis J
Pennsylvania State University

212 **Lifting Capacity and Fatigue Recovery in Healthy Young Adults and Elderly Individuals**
Annick C, Annie N, Danik L
Université de Montréal

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Muscle continued

213 Spring-Loaded Ankle Exoskeletons Reduce Metabolic Cost and Alter Gastrocnemius Fascicle Behaviour in Human Hopping
Farris D, Sawicki G
North Carolina State University and University of North Carolina at Chapel Hill

215 Predicting the Effect of Pulse Duration on Fatigue During Electrically Stimulated Non-Isometric Contractions
Marion S, Hull M, Wexler A
University of California

217 Joint-Specific Power Production, Fatigue, and Recovery During Submaximal Exercise
Elmer S, Grisham J, Hahn S, Martin J
University of Utah

Posture and Balance

219 Do Children Use a Different Strategy in Adapting to a Tendon Vibration Perturbation During Standing?
Wu J, McKay S, Angulo-Barroso R
Georgia State University

221 Effect of Arm Restriction on Upper Body Response to a Slip
Jayadas A, Boros R
Texas Tech University

223 Postural Stiffness Model and Outdoor Falls in Older Adults: The Mobilize Boston Study
Kang H, Quach L, Li W, Lipsitz L
California State Polytechnic University Pomona

225 Affect of Intensive Environmental Noise of Human Postural Control
Bateni H, Vaizasatya A, Blaschak M
Northern Illinois University

227 Foot Placement and Seat Height Effects on Sit-To-Stand Joint Moments
Gillette J, Stevermer C
Iowa State University

229 The Effect of a Subject-Specific Dual-Task on Standing Balance
Sukits A, Chambers A, Cham R, Nebes R
University of Pittsburgh

Friday, August 20, 4:30–6:00 pm

Muscle continued

214 Evaluation of Neuromuscular Dynamics of Hyperactive Reflexes at the Elbow Poststroke
Liu J, Ren Y, Xu D, Chung S, Rymer W, Zhang L
Northwestern University

216 Incorporating Velocity Characteristics into Cost Functions Does Not Alter Optimal Muscle Forces in Normal Walking
Gopalakrishnan A, Hakansson N, Higginson J
University of Delaware

Posture and Balance

218 Age-Related Modifications in Forward Reach Movement Patterns
Lin S, Liao C
National Cheng Kung University

220 The Effect of Obesity on Balance Recovery Using an Ankle Strategy is Dependent on Perturbation Type
Matrangola S, Madigan M
Virginia Polytechnic Institute and State University

222 Sensitivity and Specificity of a Clinical Screening Tool for Fall Risk
Bigelow K
University of Dayton

224 Postural Stiffness Model and Dual Task in Older Adults: The Mobilize Boston Study
Kang H, Lipsitz L
California State Polytechnic University Pomona

226 What Aspects of Postural Transitions Affect Balance Control Upon Standing?
DiDomenico A, McGorry R
Liberty Mutual Research Institute for Safety

228 Comparison of Alternate Stair Descent Patterns
Stevermer C, Hall M, Gillette J
Des Moines University

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Posture and Balance continued

231 **Is There a Tradeoff Between Stabilization and Maneuverability During Whole-Body Movements?**
Huang H, Ahmed A
University of Colorado at Boulder

233 **Fall Risk Does Not Depend on Body Mass Index**
Rosenblatt N, Premier D, Grabiner M
Univeristy of Illinois at Chicago

235 **Multiscale Entropy Identifies Complexity Changes in Postural Control of Adolescent Idopathic Scoliosis**
Busa M, Gruber A, Gorton G, Masso P, Hamill J, Van Emmerik R
University of Massachusetts Amherst

237 **Trunk Kinematics Discriminate Multidirectional Falls and Recoveries Following Large Postural Disturbances**
Cain J, Crenshaw J, Kaufman K, Grabiner M
University of Illinois at Chicago

239 **Dynamic Balance Control During Sit-To-Stand Movement: An Examination with the Center of Mass Acceleration**
Fujimoto M, Chou L
University of Oregon

241 **An Experimental Study of Postural Control During Downward Reach and Pick-Up Movements: Effects of Age and Limiting the Length of the Base of Support**
Hernandez M, Ashton-Miller J, Alexander N
University of Michigan

243 **Proactive Postural Adjustments During Multiple Exposures to Trips**
Coley B, Cham R, Nelson C
University of Pittsburgh

245 **Whole-Body Local Dynamic Stability During Walking and Running**
Qiao M, Jindrich D
Arizona State University

247 **Experimental Analysis of Kinematic Variables Associated with Biomechanical Sit-To-Stand Movement**
Mughal A, Iqbal K
University of Arkansas at Little Rock

Friday, August 20, 4:30–6:00 pm

Posture and Balance continued

230 **Lower Extremity Coordinated Mobilization and Stabilization During Static Stance: The Unique Role of the Vasti Muscles**
MacLeod T, Manal K, Snyder-Mackler L, Buchanan T
University of Delaware

232 **Spinal Cord Injury and Time to Instability in Seated Posture**
Shin S, Sosnoff J
University of Illinois at Urbana-Champaign

234 **Minimizing Postural Instability When Carrying Load: The Effects of Carrying Grocery Bags on the Elderly**
Sutton E, Bare D, Taylor M, Kinor D, Schaeffer J, Jules A, Bigelow K
University of Dayton

236 **Time-To-Contact Identifies Differences in Postural Control in Adolescent Idiopathic Scoliosis**
Gruber A, Busa M, Gorton G, Van Emmerik R, Masso P, Hamill J
University of Massachusetts Amherst

238 **Fall Risk Estimation of Community-Dwellering Elderly Using Invariant Density Analysis**
Hur P, Kang H, Lipsitz L, Hsiao-Wecksler E
University of Illinois at Urbana-Champaign

240 **Application of Augmented Reality for the Elderly Fall Risk Prediction**
Chang C, Yang S, Tsai Y, Hsieh
National Yang-Ming University,

242 **The Effect of Increased Inertia on Balance Using an Ankle Strategy**
Costello K, Matrangola S, Madigan M
Virginia Polytechnic Institute and State University

244 **Age Effects on Lateral Stability During Stepping**
King G, Akula C
University of Missouri - Kansas City

246 **Dynamic Stability During Successful and Failed Compensatory Stepping Responses**
Crenshaw J, Cain J, Grabiner M
University of Illinois at Chicago

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Prosthetics

249 Biomechanical Analysis of a Unilateral Transfemoral Amputee During Hill Walking Transitions: A Case Study
Stern K, Gottschall J
Pennsylvania State University

251 Failed Trip Recoveries of Above-Knee Amputees Suggest Possible Fall-Prevention Interventions
Crenshaw J, Kaufman K, Grabiner M
University of Illinois at Chicago

253 Differences in Sagittal Plane Angular Momentum Between Below-Knee Amputees and Non-Amputees Across a Range of Walking Speeds
Silverman A, Neptune R
University of Texas at Austin

255 Lower Extremity Mechanical Work of Different Prosthetic Feet: An Immediate Response Case Study
Allen A, Heise G, Smith J
University of Northern Colorado

257 Relationships Between Amputee Independent Prosthesis Properties and Gait Performance: A Preliminary Study
Major M, Twiste M, Kenney L, Howard D
University of Salford

259 Contribution of Toe- Off Kinematics to the Prosthetic Knee Flexion During Swing Phase of Transfemoral Amputee Gait
Dabiri Y, Najarian S, Eslami M, Zahedi S, Moser D, Shirzad E, Moradihaghighat R
Amirkabir University of Technology (Tehtan Polytechnic)

261 Response to Tripping Perturbations in Transfemoral Amputees
Sierra F, Zhang F, Huang H, D'Andrea S
Brown University

Running

263 Assessment of the Support Vector Machine for Detecting Age-Related Changes in Running Kinematics
Fukuchi R, Eskofier B, Ferber R, Duarte M
University of Calgary

265 Joint Moments During Walking and Running at Different Speeds
de David A, Stergiou P, Stefanyshyn D
University of Brasilia

Friday, August 20, 4:30–6:00 pm

Prosthetics

248 Knee Joint Forces and Moments in Below-Knee Amputees Across Increasing Steady-State Walking Speeds
Fey N, Neptune R
University of Texas at Austin

250 Individual Muscle Function in Below-Knee Amputee Walking
Silverman A, Neptune R
University of Texas at Austin

252 Virtual Prototyping Functional Characteristics of a Passive-Dynamic Ankle Foot Orthosis
Schrank E, Tierney J, Guinn L, Takahashi K, Razzook A, Stanhope S
University of Delaware

254 A Pneumatically Powered Portable Ankle-Foot Orthosis
Shorter K, Kogler G, Loth E, Durfee W, Hsiao-Wecksler E
University of Illinois at Urbana-Champaign

256 Ground Reaction Force Characteristics of Different Prosthetic Feet: An Immediate Response Case Study
Heise G, Allen A, Hoke M, Smith J
University of Northern Colorado

258 Roll-Over Shape Dynamics During Stance in Natural Gait
Takahashi K, Razzook A, Guinn L, Schrank E, Stanhope S
University of Delaware

260 Analysis of Ankle Muscle Co-Contraction in Trans-Tibial Amputees
Seyedali M, Morgenroth D, Czerniecki J, Hahn M
Veterans Health Administration Rehabilitation Research and Development Center of Excellence

Running

262 Effects of Using Heel Windows and Single Subject Analysis to Measure Rear Foot Motion During Running
Becker J, Osternig L, James S, Chou L
University of Oregon

264 Friction Demand During Running and Cutting
Blanchette M, Sigward S, Powers C
University of Southern California

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Running continued

267 Acclimation to Treadmill Running in Minimal Footwear
TenBroek T, Rodrigues P, Murphy S, Hamill J
New Balance Athletic Shoe, Inc.

269 Maximum Possible Quadriceps Force 50ms After Ground Contact
Domire Z, Boros R, Hashemi J
Texas Tech University

271 Variations in Running Form Among Female Sprinters, Middle, and Distance Runners
Cunningham R, Hunter I, Seeley M, Feland B
Brigham Young University

273 Step Width and Iliotibial Band Strain During Running
Meardon S, Campbell S, Derrick T
University of Wisconsin-La Crosse

275 Ankle Brace with a Heel Strap is Effective in Stablizing Ankle in Frontal Plane in Walking and Running
Zhang S, Wortley M, Freedman J, Carson D
University of Tennessee

277 Reducing Abnormal Alignment in Female Runners with PFPS Through Gait Retraining Using Mirror Feedback
Willy R, Noehren B, Davis I
University of Delaware

279 The Effects of Indoor Track Curve Radiuson Sprint Speed and Ground Reaction Forces
Tukuafu J, Hunter I
Brigham Young University

Friday, August 20, 4:30–6:00 pm

Running continued

266 High Plantar-Flexor Passive Stiffness Increases Achilles Tendon Loading During Landings
Whitting J, Steele J, McGhee D, Munro B
University of Wollongong

268 The Effect of Functional Fatigue and Ankle Bracing on Lower Extremity Response to Jump Landing Tasks
Stafford E, Gillette J
Iowa State University

270 Ground Contact Time and Running Speed in Elite Championship Distance Races
Hunter I, Cunningham R, Ingebretsen S, Butler D
Brigham Young University

272 A Prospective Study of Loading Rates in Female Runners Who Develop Plantar Fasciitis
Bowser B, Hamill J, Davis I
University of Delaware

274 Variation of Anatomical Parameters That Affect Estimated Anterior Cruciate Loading During Drop Landings
Koehler C, Lopez T, Kernozek T, Ragan R
University of Wisconsin-La Crosse

276 Metatarsophalangeal Joint Kinetics in Running and Jumping
Forrester S, Hofmans E
Loughborough University

278 Change in Medial Longitudinal Arch Stiffness After a Prolonged Run
Hageman E, Ward E, Derrick T
Iowa State University

280 Are the Vibram Fivefingers a Functional Alternative to Barefoot Running in Inexperienced Barefoot Runners?
Paquette M, Baumgartner L, Zhang S
University of Tennessee

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Spine

281 Neck Motion due to the Halo-Vest in Prone and Supine Positions
Ivancic P, Telles C
Yale University

283 Dynamic Modeling of Human Lumbar Spine Via Msc Adams
Tabesh M, Elahinia M
University of Toledo

285 Disturbances to Intrinsic Stiffness and Reflexive Muscle Responses Following Prolonged Trunk Flexion
Hendershot B, Bazrgari B, Muslim K, Toosizadeh N, Nussbaum M, Madigan M
Virginia Polytechnic Institute and State University

287 A New Surrogate Bone Model for Testing Intervertebral Devices
Au A, Aiyangar A, Anderson P, Ploeg H
University of Wisconsin-Madison

289 Inter-Examiner Comparisons of a Human Clinical Cervical Diagnosis Technique
Rutledge B, Reid-Bush T, Vorro J, DeStefano L, Francisco T, Gorbis S
Michigan State University

291 A Finite Element Study of Dual Bearing Surface Sliding Kinematics and Wear in the Charite Total Disc Replacement
Goreham-Voss C, Brown T
University of Iowa

293 Dynamic Response of the Trunk to Position Perturbations - Effects of Gender, Preload, and Trunk Angle
Miller E, Bazrgari B, Hendershot B, Nussbaum M, Madigan M
Virginia Polytechnic Institute and State University

295 The Quantitative Assessment of Contribution of Risk Factors to Overstress at Adjacent Segments After Lumbar Fusion: Removal of Posterior Ligaments Pedicle Screws
Kang K, Lee H, Kim K, Kim H, Jang J
Yonseisarang Hospital

Friday, August 20, 4:30–6:00 pm

Spine

282 Mechanisms of Whiplash Injury Prevention Attributable to Energy-Absorbing Seat
Ivancic P, Xiao M
Yale University

284 Identification of Hyperelastic Properties of Lumbar Multifidus
Koo T, Zheng Y
New York Chiropractic College

286 Load Bearing Capability of Annular Fibers is Affected by Their Incomplete Length: A Finite Element Model Analysis
Hussain M, Gay R, An K
Logan University

288 Assessment of Gender Variations in the Cervical Response to Rear Impacts
Fritz J, Harris G
Marquette University

290 Comparison of Energy Dissipation in Thoracolumbar Motion Segments due to Load Frequency Variation
Campbell-Kyureghyan N, Yalla S
University of Wisconsin-Milwaukee

292 Effect of Off-Axis Fluoroscopy Imaging on 2D Lumbar Spine Kinematics
Ben-Abraham E, Zhao K, Magnuson D, Shaw M, Berglund L, Gay R, An K
Mayo Clinic

294 Cervical Spine Center of Rotation During in Vivo Dynamic Flexion / Extension
Baillargeon E, Lee J, Donaldson W, Kang J, Anderst W
University of Pittsburgh

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Sports

297 **Quantative Analysis of SEMG of the Upper Extremity Musculature while Cutting Common Paddle Sport Entanglement Materials Using Two Different Tools**
Oliver G, Aldrich T, Moiseichik M
University of Arkansas

299 **Association Between Attributes of a Cyclist and Bicycle Seat Pressure**
Nash D, Bressel E, Dolny D
Utah State University

301 **Archery Biomechanics: A Kinematical Approach**
Ertan H, Irmak R
Anadolu University

303 **The Influence of Glove and Hand Position on Pressure Over the Ulnar Nerve During Cycling**
Slane J, Timmerman M, Ploeg H, Thelen D
University of Wisconsin-Madison

305 **Identifying Different Biomechanical Techniques - Technique Taxonomy Applied to Golf Putting.**
McLaughlin P, Best R
Victoria University

307 **The Influence of Tissue Masses on Lower Extremity Injuries and Reported Pain in Varsity Soccer Players**
Schinkel-Ivy A, Burkhart T, Andrews D
University of Windsor

309 **Effects of Equine Racetrack Surface Type, Depth, and Confining Area on Force and Displacement Measurements Using a Track-Testing Device**
Setterbo J, Yamaguchi A, Hubbard M, Upadhyaya S, Stover S
University of California, Davis

311 **Regulation of Angular Impulse During Golf Swings with Different Clubs**
McNitt-Gray J, Requejo P, Flashner H
University of Southern California

313 **A Kinematic Comparison of Three Different Volleyball Blocking Techniques**
Neves T, Seeley M, Johnson A, Myrer J
Brigham Young University

315 **Biomechanics of the Cross-Country Sit-Skier and Impact on Sit-Ski Design - a Top Secret 2010 Project**
Leblanc-Lebeau M, Rancourt D, Langelier E, Cyr M, Lessard J, Smeesters C
Universite de Sherbrooke

Friday, August 20, 4:30–6:00 pm

Sports

296 **Optimizing Position of the Horizontal Bench Press Using Surface Electromyography**
Jagessar M
University of Trinidad and Tobago

298 **Windmill Pitching Kinetics: Injury Implications in High School Softball Pitchers**
Plummer H, Keeley D, Oliver G
University of Arkansas

300 **Application of Spacesuit Glove Performance Tests to Athletic and Personal Protective Equipment**
England S, Benson E, Mesloh M, Thompson S, Rajulu S
MEI Technologies, Inc.

302 **The Influence of Sex and Maturation on Knee Valgus Moments During Cutting: Implications for ACL Injury**
Powers C, Pollard C, Lee S, Cesar G, Sigward S
University of Southern California

304 **A Model Predicting Anterior Shear Stress in the Shoulder During the Slide Step Delivery in High School Baseball Pitchers**
Keeley D, Oliver G, Hackett T, Torry M
University of Arkansas

306 **Two-Dimensional Sequential Analysis of the Front Snap Kick**
Weimar W, Madsen N, Garner J, Wang Y
Auburn University

308 **Frequency Response of the Wrist and Elbow Following Impacts with and Without Wrist Guards**
Burkhart T, Andrews D
University of Windsor

310 **Contribution of Trunk and Pelvis Rotation to Punching in Boxing**
Cabral S, João F, Amado S, Veloso A
Technical University of Lisbon

312 **A Framework for Measurement and Modeling of Human Climbing**
Russell S, Zirker C, Blemker S
University of Virginia

314 **Lumbopelvic Stability Correlates to Transverse Lumbar Spine Torque During the Golf Swing**
Yontz N, Jamison S, Chaudhari A
Ohio State University

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Sports continued

317 Variations in Climbing Strategies Between Experienced and Inexperienced Rock Climbers
Zirker C, Russell S, Blemker S
University of Virginia

319 Biomechanical Energetic Analysis of Pitching Motion of Professional Japanese Baseball Pitchers
Aoki K, Mochimaru M, Himeno R
National Institute of Advanced Industrial Science and Technology

Tissue Mechanics

321 Frequency Content of Cartilage Impact Signal Reflects Acute Histologic Structural Damage
Heiner A, Martin J, McKinley T, Goetz J, Thedens D, Brown T
University of Iowa

323 Localized Measures of Tendon Impingement on the Median Nerve Within the Carpal Tunnel
Kunze N, Goetz J, Thedens D, Baer T, Lawler E, Brown T
University of Iowa

325 Temperature Dependence on Porcine Internal Carotid Artery Vascular Mechanics
Fitzpatrick J, Capaldi F
Drexel University

327 A 3-D Breast Software Phantom to Investigate Breast Biomechanics During Ultrasound Strain Imaging Using Finite Element Modeling
Hashmi S, Keralapura M
San Jose State University

329 Testing for Material Properties of the Human Anterior Cruciate Ligament
Ren Y, Ahn C, Park H, Fang D, Zhang L
Rehabilitation Institute of Chicago

331 Changes in Cross Sectional Stress at the Distal Radius Following Short Term Mechanical Loading
Edwards W, Troy K
University of Illinois at Chicago

333 Understanding the Effects of Ligament Sectioning on the Stability of the Ankle and Subtalar Joint Using Euler Angles and the Rotation About a Helical Axis
Choisne J, Ringleb S, Samaan M, Bawab S, Naik D
Old Dominion University

Friday, August 20, 4:30–6:00 pm

Sports continued

316 Steady-State Handling Characteristics of a Bicycle
Cain S, Perkins N
University of Michigan

318 Velocity of the Taekwondo Axe Kick and Resultant Linear Acceleration of an Instrumented Head Form
Fife G, Kaminski T, O'Sullivan D, Pieter W, Shin I, Lim T
University of Delaware

Tissue Mechanics

320 Relationship Between Sacral Skin Blood Flow Oscillations and Vasodilatory Functions in People at Risk for Pressure Ulcers
Jan Y, Liao F, Garrison D, Anderson M
University of Oklahoma Health Sciences Center

322 Evaluation of Frost's 3-Way Rule Equation for Bone Adaptation to Mechanical Stimulation
Rastgar Agah M, Yingling V
Temple University

324 Relationships Between Dual Energy X-Ray Absorptiometry (DXA) and Computed Tomography (CT) Measures of Bone and Their Ability to Predict Fracture Load
Troy K, Edwards W
University of Illinois at Chicago

326 Effects of Posterior Capsule Attachment Status on Flexion Moment Resistance in the Hip
Stroud N, Rudert J, Baer T, Brown T
University of Iowa

328 Effects of Normal and Shear Loads on Blood Perfusion and Reactive Hyperemia in the Skin
Manorama A, Reid-Bush T, Baek S
Michigan State University

330 Viscoelastic Properties of Diabetic and Non-Diabetic Plantar Soft Tissue
Pai S, Ledoux W
University of Washington

332 ACL Length Changes During Robotic Simulation of Knee Laxity Tests
Lee A, Hagen J, Wahl C, Manner P, Cavanagh P
University of Washington

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Tissue Mechanics continued

335 Fatigue Properties of Proximal Humeral Fractures Fixed with Locked Plate System
Li J, Hymes R, Schulman J, Theiss M
Inova Fairfax Hospital

337 Simulation of a Percutaneous Aortic Valve Deployment into a Patient-Specific Aortic Root
Sirois E, Wang Q, Sun W
University of Connecticut

Upper Extremity

339 Elbow and Wrist Muscle Fiber Operating Ranges Throughout the Range of Motion for Flexion-Extension and Pronation-Supination
Dorman D, Warren R, Gonzalez R
LeTourneau University

341 Kinematic and Kinetic Analysis of Shoulder Motion During Tetraplegic Wheelchair Propulsion
Yarossi M, Dyson-Hudson T, Forrest G, Kwarciak A, Sisto S
Kessler Foundation Research Center

343 Effect of Concomitant Latissimus Dorsi Transfer on Joint Reaction Force for Reverse Total Shoulder Arthroplasty
Hansen M, Otis J, Ciccone W, Jacofsky M, Jaczynski A, Boyles A
SHRI-CORE Research Labs

345 Alterations in Shoulder Joint Perception Pre and Post Workday
Ettinger L, Kincl L, Karduna A
University of Oregon

347 Effect of Plication on Gleno-Humeral Translation: A Preliminary in Vitro Study
Rao S, Miana A, Lenhoff M, Backus S, Vanadurongwan B, Chen N, Brown A, Coleman S, Cordasco F, Altchek D, Fealy S, Imhauser C, Karduna A, Warren R, Wright T, Zifchock R, Hillstrom H
Hospital for Special Surgery

349 Shoulder External Rotation During Physical Assessment and Throwing Activity
Zheng N, Eaton K
University of North Carolina at Charlotte

Friday, August 20, 4:30–6:00 pm

Tissue Mechanics continued

334 A New Instrument for Assessing Heel Pad Mechanical Properties
Gales D, Challis J
Pennsylvania State University

336 The Use of Ultrasound Elastography to Assess Long-Term Tendon Remodeling and Mechanics Following Musculotendon Injury
Chernak L, Silder A, Lee K, Thelen D
University of Wisconsin-Madison

Upper Extremity

338 High Coefficient of Friction at the Hand-Object Interface Contributes to Increased Maximum Grip Force by the Phalanxes During Power Grip
Enders L, Engel A, Seo N
University of Wisconsin-Milwaukee

340 The Influence of Altering Push Force Effectiveness on Individual Muscle Demand During Wheelchair Propulsion
Rankin J, Kwarciak A, Richter W, Neptune R
University of Texas at Austin

342 Correlation Between Wrist Biomechanics and Median Nerve Health Parameters in Manual Wheelchair Users
Toosi K, Impink B, Collinger J, Yang J, Koontz A, Boninger M
University of Pittsburgh

344 Shoulder Kinematic Patterns During Execution of Circuit Resistance Training in Individuals with Paraplegia: a Case Series
Riek L, Ludewig P, Nawoczenski D
University of Rochester

346 The Effects of Noise and Inertia Distribution During a Planar Reaching Task
Nguyen H, Dingwell J
University of Texas at Austin

348 The Effect of Biceps Reattachment Site on Moment Arm
Weir D, Schmidt C, Wong A, Howard M, Miller M
University of Pittsburgh

350 A Dynamic CT Technique for Assessment of Wrist Joint Instability
Zhao K, Leng S, Qu M, McCollough C, An K
Mayo Clinic

Poster Sessions

Thursday, August 19, 4:30–6:00 pm

Upper Extremity continued

351 A Method of Geometric Description of the Glenoid Fossa
Gielo-Perczak K
Worcester Polytechnic Institute

353 Geometric Variability in the Subchondral Bone Surfaces of the First Trapeziometacarpal Joint
Halilaj E, Rainbow M, Patel N, Moore D, Crisco J
Brown University

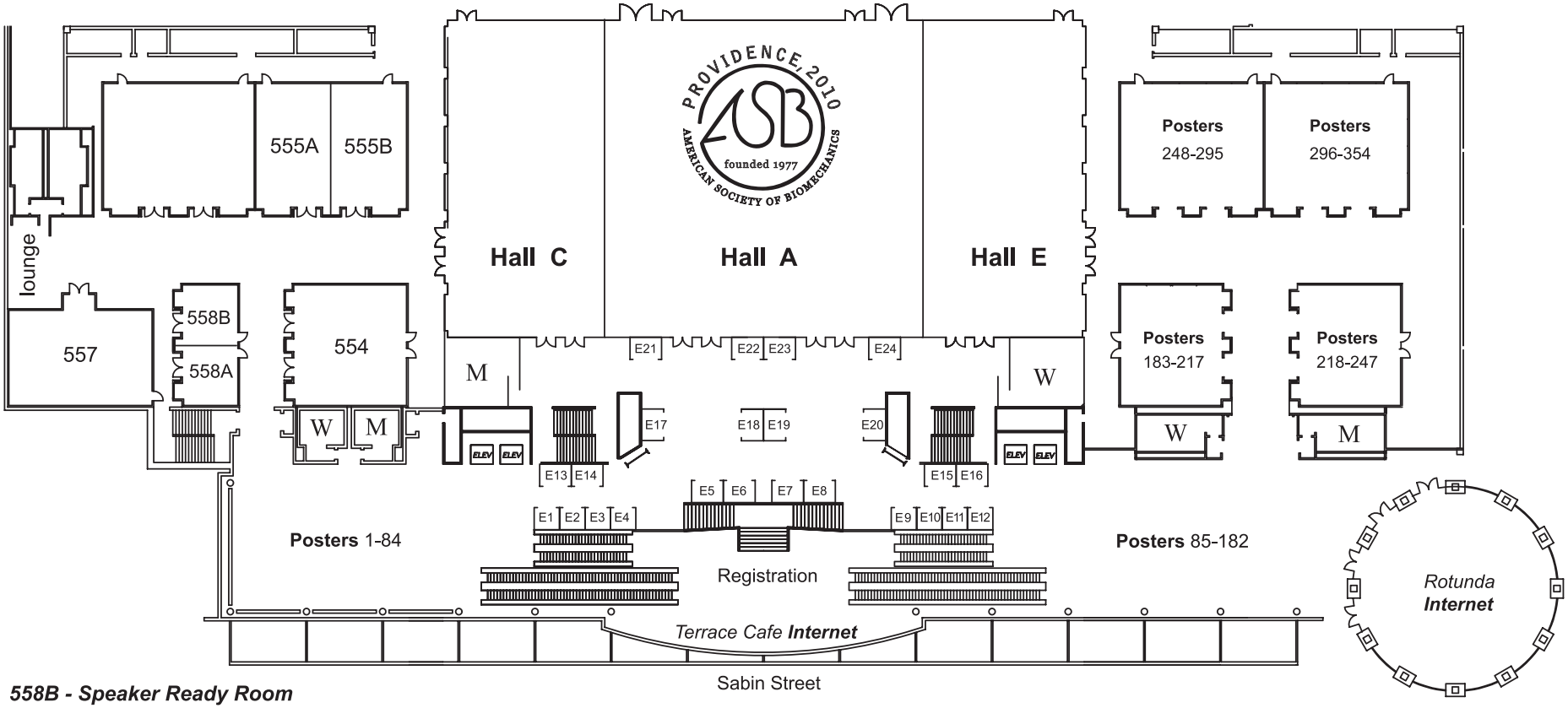
Friday, August 20, 4:30–6:00 pm

Upper Extremity continued

352 Effects of Midcarpal Arthrodesis on Wrist Coupling and Performance
Garg R, Kraszewski A, Stocklein H, Backus S, Lenhoff M, Wolff A, Hillstrom H, Wolfe S
Hospital For Special Surgery

354 Effects of Crutch Type and Arm Dominance on Shoulder Joint Kinetics During Three Point Swing Through Gait
Singhal K, Casebolt J, Kwon M, Jackson E, Kwon Y
Texas Womans University

Rhode Island Convention Center 5th Floor



558B - Speaker Ready Room
555A - Exhibitors' Presentations

ASB Bus Stop at Street Level