



ESMAC 2023

18–23 September 2023
Athens, Greece

**Programme
Book**

www.esmac2023.org

Acknowledgements

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Supporters



Other Partners



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Welcome Word

Dear ESMAC Friends and Colleagues,

It is a pleasure to welcome you all to the ESMAC 2023 Meeting in Athens. Following the highly successful conference in Dublin in 2022, ESMAC 2023 is offering a new inspiring opportunity to share experiences, exchange ideas and foster interactions amongst professionals, who believe in the scientific value of movement analysis. The program represents an overview of innovative research in motion analysis, with a strong translational dimension, covering fundamental and methodological topics as well as applied topics in the clinical field and sports.

During the three-day preconference gait course, a multidisciplinary international team of experts in gait analysis guide the attendees through the techniques and interpretation of gait analysis for research and clinical practice. The 2-day pre-conference seminar program offers four interactive sessions, that focus on "Smart Gaming for Rehabilitation", "Markerless Motion Analysis", "Altered Muscle Function in Children with Cerebral Palsy" and "Musculoskeletal Modeling".

The 3-day conference provides an interdisciplinary platform for clinicians and researchers to share their knowledge through over 120 oral and 150 poster presentations. We hope you will exploit the opportunity to discuss research approaches, challenges and results, reflect on novel ideas and create networks during the planned presentation sessions, the breaks in between the sessions and a variety of events that have been included in the program.

The honored Baumann lecture, in memory of Prof. Baumann, will be presented by the former ESMAC chair Sebastian Wolf, who will discuss the role of toes during walking. Three other excellent keynotes with prestigious experts in the field of motion analysis are planned. George Georgoulis will share his experience in the neurosurgery and neurological field, Łukasz Kidziński will discuss the use of artificial intelligence in motion analysis and Tim Theologis will present his view on clinical research in cerebral palsy and the role of gait analysis.

On a social front, we invite you to join us for the Charity Run over a 'rich' track in the centre of Athens, where you can feel the link with the modern Olympic games as well as with the ancient Greek sites. The income of the charity Run will be donated to the ELEPAP family of Brave Children. Every running step will help children with disabilities to make their own 'Life Steps'.

Athens is a magnificent city, with a perfect venue for the ESMAC conference. The whole ESMAC event is hosted in the Royal Olympic Hotel, in the heart of Athens and next to historical sites (Acropolis of Athens, Hadrian's Arch, Temple of Olympian Zeus, Zappeion Hall, National Garden, Panatheniac Stadium, etc.). We also invite you to explore the Athenian nightlife, the local kitchen, and the lovely Athenian Riviera. The Gala dinner in Marina Vouliagmeni will give the chance to meet and share a drink with ESMAC friends and colleagues.

We will do everything possible to make your stay in Athens an interesting, pleasant and unforgettable experience.



Georgios Gkrimas

Local Organizing Committee Chair



Kaat Desloovere

Scientific Chair

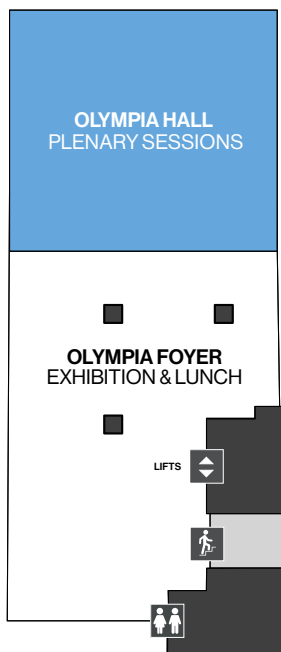
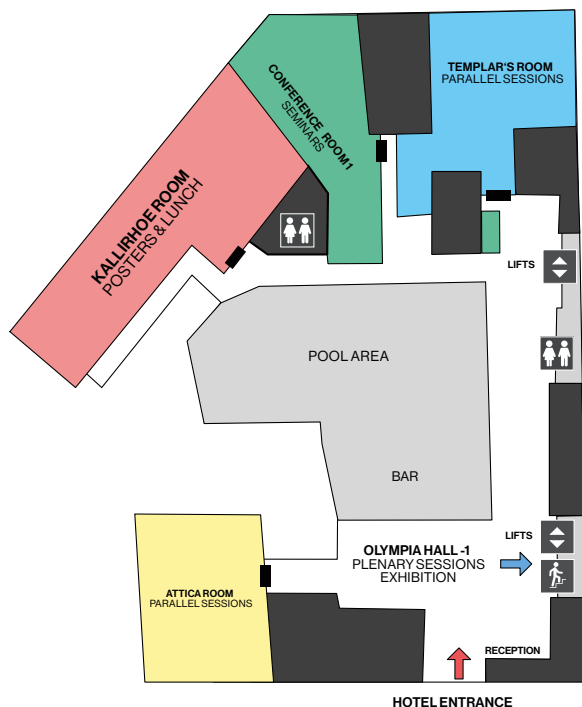
Venue

Royal Olympic Hotel

28-34 Athanasiou Diakou str. 11743

Athens, Greece

www.royalolympic.com



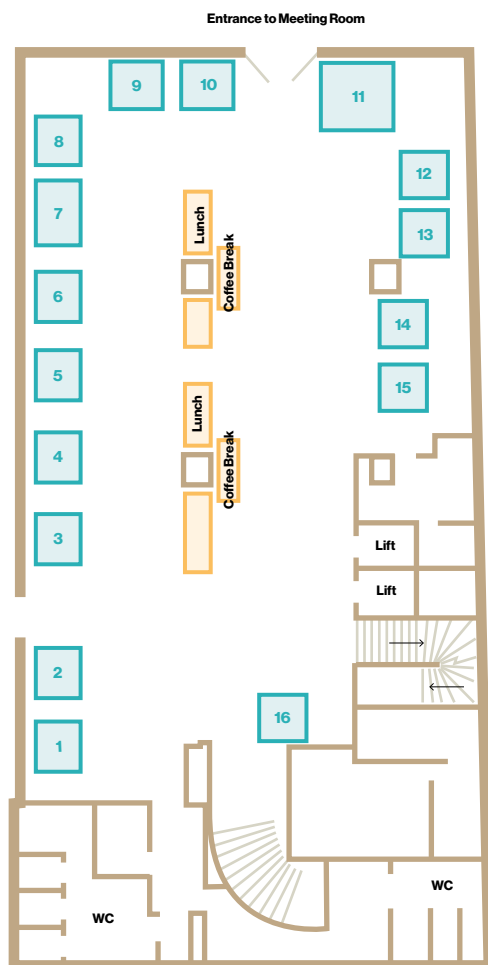
Lobby Level

- OLYMPIA HALL**
PLENARY SESSIONS & EXHIBITION
- ATTICA ROOM**
PARALLEL SESSIONS
- TEMPLAR'S ROOM**
PARALLEL SESSIONS
- KALLIRHOE ROOM**
POSTERS & LUNCH
- CONFERENCE ROOMS**
SEMINARS & REGISTRATION FOR SEMINARS

-1 Floor

- OLYMPIA HALL**
PLENARY SESSIONS
- OLYMPIA FOYER**
EXHIBITION & LUNCH

Exhibition



Exhibitors

- 1 Instituto de Biomecánica de Valencia
- 2 novel
- 3 Bertec
- 4 Moveck
- 5 Qualisys
- 6 XSENSOR
- 7 Motek
- 8 Theia Markerless
- 9 Serinth
- 10 Cometa
- 11 Vicon
- 12 Delsys Europe
- 13 CONTEMPLAS
- 14 AMTI
- 15 Movella
- 16 Moveshelf

Practical Information

Venue

Royal Olympic Hotel

28-34 Athanasiou Diakou str. 11743

Athens, Greece

www.royalolympic.com

Registration Opening Hours

Gait Course and Seminars –

Templars Hall, Lobby Level

Monday 18 September	07:30–18:00
Tuesday 19 September	07:30–18:00
Wednesday 20 September	07:30–16:00

Main Conference –

Royal Olympic Lobby area, Lobby Level

Wednesday 20 September	16:00–19:00
Thursday 21 September	07:30–19:00
Friday 22 September	08:00–19:00
Saturday 23 September	08:00–14:00

Exhibition Opening Hours

Olympia Hall Foyer, Level -1

Thursday 21 September	08:00–17:30
Friday 22 September	08:30–17:30
Saturday 23 September	08:30–13:30

Abstract Book

Abstracts are available online in the Gait & Posture, will be linked from event website.

Badges

Name badge shall always be worn when attending the sessions and official programme.

Certificate of Attendance

Registered and attending participants can download their Certificate of Attendance

in the Online Registration portal within one week after the event.

Doctor / First Aid / Emergency

In case of emergency, please refer to the Royal Olympic Hotel reception or the ESMAC 2023 Organizing team to ask for assistance or call 112 directly.

Evaluation Form

The Meeting Evaluation form (Survey) will be available online on the Meeting website after the event and it will be sent to delegates by email.

Food and Beverages

Coffee breaks and lunches are included in the registration fee and will be served within the Poster area (Kallirhoe room, Lobby level) and in the Exhibition area (Olympia hall foyer, Level -1).

How to get to Royal Olympic Hotel

From Athens International Airport by METRO / UNDERGROUND

Board the Metro from the Airport's Station and get off at Syntagma Station. At Syntagma Station switch the lines in the direction of Elliniko and get off at the first Station, the "Acropolis Station".

From Acropolis Station the Hotel is 150 m away, walking along Ath. Diakou Street. For more details on transportation see the hotel's website here <https://www.royalolympic.com/athens-center-hotel/>

Insurance and Liability

The Organisers will accept no liability for personal injuries sustained or for loss

or damage to property belongings of Meeting participants, accompanying persons either during or because of the Meeting or during the accompanying programme. Participants are recommended to seek insurance coverage for health and accident, lost luggage, and trip cancellation.

Internet

Wi-Fi is available in the venue for all delegates, the password is royal2023.

Language of the Meeting

The official language of the ESMAC Annual Meeting is English. All lectures will be delivered in English and no interpretation is provided.

Lost & Found

A lost and found service is available at the Registration Desk in the ESMAC Meeting area.

Photos

Please do not take photos of the presentations.

Posters

Poster area is in the Kallirhoe Room, Lobby Level.

Presentations

Presentations must be handed over to the personnel in the lecture room with USB stick at least 15 minutes before the start of the entire session. All speakers are requested to be in the lecture room 10 minutes before the session starts to meet with the session chairs.

Contact Details

ESMAC Meeting Secretariat

C-IN

Tel.: +420 296 219 600

ESMAC 2023 Hotline: +420 727 803 223

Registration: registration@esmac.org

Abstracts: abstracts@esmac.org

ESMAC Secretariat: info@esmac.org

Disclaimer

The Meeting Organisers have taken all reasonable care in deciding for the Meeting. In the event of unforeseen disruptions, neither the organisers nor their agents can be held responsible for any losses or damages incurred by delegates. The programme is correct at the time of printing, but organisers reserve the right to alter the programme when deemed necessary. The Meeting Organisers act as agents only in securing hotels, transport, and travel services, and shall in no event be liable for acts or commissions in the event of injury, damage, loss, accident delay or irregularity of any kind whatsoever during arrangements organised through contractors or by the employees of such contractors. Hotel and transportation services are subject to the terms and conditions under which they are offered to the public. Delegates should make their own arrangements with respect to personal insurance. The Meeting Organisers reserve the right to make changes as and when deemed necessary, without prior notice to the parties concerned. All disputes are subject to resolution under Czech Law.

Programme Changes

The Meeting Organisers cannot assume liability for any changes in the programme due to the external or unforeseen circumstances.

Data Privacy and Security

For our Privacy Policy please refer to website – www.czech-in.org/C-IN/GDPR/privacy-policy.html

Programme at a Glance

Pre-conference Seminars		
Time	19 September Tuesday	20 September Wednesday
8:30	Seminar 1 Markerless Motion Analysis	Seminar 3 Improved understanding and treatment of altered muscle function in children with Cerebral palsy, by integrating macro- and microscopic muscle properties with neuromuscular symptoms
10:10		Break
10:30	Break	Seminar 3 Improved understanding and treatment of altered muscle function in children with Cerebral palsy, by integrating macro- and microscopic muscle properties with neuromuscular symptoms
11:00	Seminar 1 Markerless Motion Analysis	
12:30	Break	Break
13:30		
15:00	Seminar 2 Smart gaming for remote rehabilitation, a "hands-on" workshop	Seminar 4 Introduction to musculoskeletal modeling
17:30	Break	Break
18:00	Seminar 2 Smart gaming for remote rehabilitation, a "hands-on" workshop	Seminar 4 Introduction to musculoskeletal modeling
19:30		Welcome Cocktail
		Early Career Network (ECN)

ESMAC Main Conference

Time	21 September Thursday	22 September Friday	23 September Saturday
7:00		Charity Run (7:00-8:00)	
8:30	Opening & Awards Session		
8:35	Baumann Lecture - Prof Sebastian Wolf (past president of ESMAC)	9) Foot and ankle (starts 8:35)	15) Movement analysis methodology III
9:20	1) Modelling and simulation I		
10:25	Sponsors' Pitches - 10 mins	Moveshef Presentation	
10:30	Coffee Break (10:35)	Coffee Break (10:30)	Coffee Break (10:35)
11:00	2) Pediatric neurology	10) Markerless motion analysis	16) Adult neurology
12:15	Keynote Lecture 1 George Georgoulis	Contemplas + Movella Industry Presentation	Keynote Lecture 3 Tim Theologis
12:25		Keynote Lecture 2 Łukasz Kidziński	
13:00-13:30	Vicon Industry Workshop		Award & Closing Ceremony
13:10	Lunch & Posters I.	Lunch & Posters II.	
14:15	3) Modelling and simulation II	4) Stability, proprioception & motor control	5) Musculoskeletal disorders
15:30	6) Sports	7) Movement analysis methodology I	8) Pediatrics and neuro-pediatrics
16:00		11) Movement analysis methodology II	12) Upper extremity
17:40	ESMAC Annual General Assembly		
18:40	Motek User Group Meeting (18:40-20:00)		
19:30		ESMAC Gala Dinner (19:30-00:00)	

Gait Course

18–20 September 2023

The ESMAC Gait Course will be held in the Templars Hall, Lobby Level

The ESMAC Gait Course in Athens is a three-day course for beginners and people who like to refresh their knowledge in clinical gait analysis. We dive into an introduction to gait analysis, normal gait vs. pathological gait, case examples, and principles of data interpretation while having both theoretical and practical sessions. We regularly adapt the course content according to new developments and incorporate feedback from former students to keep the course attractive and alive.

The first day highlights requirements and development of healthy walking, motion analysis from 2D to 3D as well as marker placement. On the second day, more detailed aspects of gait analysis (kinematics, kinetics, EMG, quality insurance) are covered in theoretical courses as well as in practical sessions. The third and final day includes methods of integrating and communicating clinical gait analysis data as well as discussing case examples in small groups. The different sessions are led by experienced gait analysts with different clinical and technical backgrounds.

[See the Gait Course Programme](#)

<https://www.esmac2023.org/gait-course/>

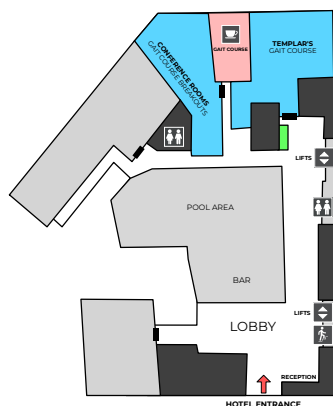
[See the ESMAC Teaching Faculty](#)

<https://esmac.org/gait-course/teachers/>



Dr. Ursula Trinler

ESMAC Gait Course Organizer



GAIT COURSE

- **REGISTRATION**
GAIT COURSE & SEMINARS
- **TEMPLAR'S ROOM**
GAIT COURSE
- **CONFERENCE ROOMS 2 & 3**
GAIT COURSE BREAKOUTS
- **ABBIEY**
GAIT COURSE LUNCH & COFFEE BREAK AREA

Pre-Conference Seminars

The pre-conference Seminars will be held in Conference Room 1, Level 1

Tuesday 19 September at 08:30–12:30

Markerless Motion Analysis

Athanasios Mastrogeorgiou (Thanasis), Control Systems Lab of the National Technical University of Athens, Greece

Aikaterini Smyrli (Katerina), Control Systems Lab of the National Technical University of Athens, Greece

Tuesday 19 September at 13:30–17:30

Smart gaming for remote rehabilitation, a “hands-on” workshop

Prof. Gabor Barton, Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, Liverpool, UK.

Jacob Beesley, Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, Liverpool, UK.

Wednesday 20 September at 08:30–12:30

Improved understanding and treatment of altered muscle function in children with cerebral palsy

Kaat Desloovere, Department of Rehabilitation Sciences and Department of Development and Regeneration of the University of Leuven, Belgium

Lynn Bar-On, Department of Rehabilitation Sciences of the University of Ghent, Belgium

Annemieke Buizer, Rehabilitation Medicine of the Amsterdam UMC and Amsterdam Movement Sciences, The Netherlands

Annika Kruse and Martin Svehlik, Department of Biomechanics of the University of Graz and Department of Orthopaedics and Trauma of the Medical University of Graz, Austria

Ferdinand Von Walden and Eva Pontén

Wednesday 20 September at 13:30–17:30

Introduction to musculoskeletal modeling

Hans Kainz, Neuromechanics Research Group, University of Vienna, Austria

Bryce Killen, Human Movement Biomechanics Research Group at KU Leuven, Belgium

Baumann Lecture



Sebastian Wolf

Sebastian Wolf is a physicist and moved to the field of Human Movement Analysis in 2001 when he started as technical head of the Movement Analysis Lab, Center for Orthopedics, Trauma Surgery and Spinal Cord Injury, Heidelberg University Hospital, Germany.

Meanwhile, he is the Director of the Division Human Movement Analysis responsible both for the clinical gait analysis service and the clinical research in this field. In 2015 he became associate professor and three years later was given the title as extra-ordinary professor for Orthopedic Biomechanics at the Medical Faculty of Heidelberg University. With colleagues he founded the German speaking society for gait analysis GAMMA in 2005 and was leading this society until 2013. He was also the President of the European Society for Movement Analysis in Adults and Children (ESMAC) in years 2015 to 2019.

Sebastian Wolf is active in clinical motion analysis with continuing scientific interest in advancing knowledge in neurologic and orthopedic gait disorders and mobility related medical healthcare, specifically in prosthetics and orthotics. He is teaching gait courses of GAMMA since 2005 and is a teacher at ESMAC gait courses since 2014.

Keynote Speakers



George Georgoulis

George Georgoulis is certified Neurosurgeon working at the General Hospital of Athens “G.Gennimatas”, Department of Neurosurgery. He joined a fellowship program for Neurosurgery of Spasticity directed by Professor Sindou at Hôpital Neurologique “Pierre Wertheimer” Lyon, University of Lyon 1.

He participates on the multidisciplinary team for Cerebral Palsy Children at the University of Athens. He is invited lecturer in several (pediatric) meetings, in particular the European Society of Pediatric Neurosurgery. His publications are cited in prestigious neurosurgical and neurological journals. Among general neurosurgery his topics of interest are microsurgery for spasticity, intraventricular neuroendoscopy and intracranial meningiomas.

Keynote Speakers



Łukasz Kidziński

Łukasz is the director of Artificial Intelligence at Clario, a leading contract research organization in decentralized clinical trials, and a researcher at Stanford University, working on using artificial intelligence for quantifying health.

He joined Clario through the acquisition of his startup Saliency, building software for automating imaging and video workflows in clinical trials. He obtained a Ph.D. from Université Libre de Bruxelles in mathematical statistics.

Keynote Speakers



Tim Theologis

Tim Theologis is an Associate Professor of Orthopaedic Surgery at Oxford University and an honorary Consultant Orthopaedic Surgeon at Oxford University Hospitals.

He looks after children with orthopaedic conditions, including developmental dysplasia of the hip, musculoskeletal tumours, neuromuscular disorders, and cerebral palsy. He is involved in the teaching of medical students, the supervision of post-graduate degrees and the training of orthopaedic residents. He has an active academic interest, leading multi-centre clinical research studies in children's orthopaedics and holding major research grants. He is Emeritus Editor in Chief for Gait and Posture and was President of ESMAC between 2005–2010. He has been a Board member of the British Society for Children's Orthopaedic Surgery since 2009 and its President between 2018–2020.

Social Events

Welcome Cocktail

Wednesday, 20 September 2023 at 18:00–19:30

Royal Olympic Hotel, Roof Garden

Included in the registration fee for the Main Conference.

All attendees should bring their conference badge to be allowed entry.

Early Career Network (ECN)

**Wednesday, 20 September 2023
at 19:30–21:00**

**Royal Olympic Hotel,
Templars Hall**

This event targets PhD students in the later stages of their education, post docs and research fellows aiming for a permanent position.



ESMAC Charity Run

Friday, 22 September 2023 at 07:00–08:00

Zappeion Megaron

Tickets at 25 EUR

www.esmac2023.org/charity-run/

Gala Dinner

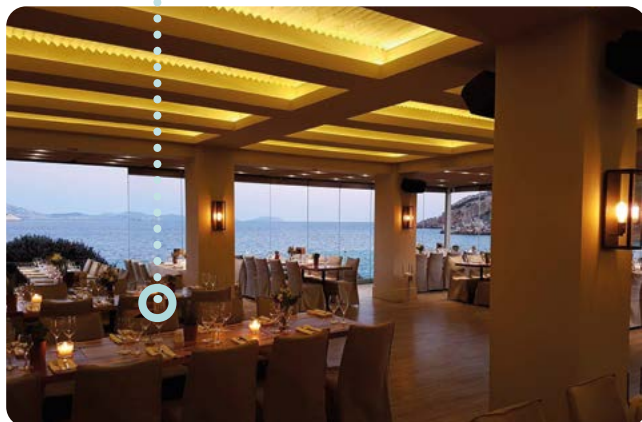
**Friday, 22 September 2023
at 19:30–00:00**

**Moorings restaurant,
Marina Vouliagmeni**

www.moorings.gr/en

Tickets at 80 EUR

FULLY BOOKED



Detailed Programme

Thursday 21 September

Opening & Awards Session

21. 9. 2023, 8:30–8:50, Olympia Hall

Opening Words

Georgios Gkrimas, Greece

Kaat Desloovere, Belgium

Baumann Lecture

21. 9. 2023, 8:50–9:20, Olympia Hall

Do we need toes for walking?

Chair: Ayman Assi (Lebanon)

Speaker: Prof. Sebastian Wolf (Germany)

1) Modelling and simulation I

Plenary Session:

09:20–10:25, Olympia Hall

Chairs: Hans Kainz (Austria), Maria B. Sánchez (United Kingdom)

O 001 ☆ Selective personalization of muscle-tendon properties for predictive simulations of walking in children with cerebral palsy

Dhruv Gupta¹, Bram Van Den Bosch¹, Ilse Jonkers¹, Anja Van Campenhout², Kaat Desloovere³, Friedl De Groot¹

¹ KU Leuven, Department of Movement Sciences, Leuven, Belgium

² KU Leuven / UZ Leuven, Development and Regeneration, Leuven, Belgium

³ KU Leuven / UZ Leuven, Rehabilitation Sciences, Leuven, Belgium

O 002 Rectus femoris EMG clustering, A data-driven management of crouch gait in patients with cerebral palsy (CP)

Mehrdad Davoudi¹, Firooz Salami¹, Robert Reisi¹, Sebastian I. Wolf¹

¹ Heidelberg University Hospital, Clinic for Orthopedics and Trauma Surgery, Heidelberg, Germany

O 003 ☆ Femoral growth plate stresses in children with cerebral palsy compared to typically developing children

Willi Koller¹, Wallnöfer Elias¹, Jana Holder², Andreas Kranz³, Arnold Baca¹, Hans Kainz¹

¹ Centre for Sport Science and University Sports- University of Vienna, Department of Biomechanics- Kinesiology and Computer Science in Sport, Vienna, Austria

² University of Salzburg, Department of Sport and Exercise Science, Salzburg, Austria

³ Orthopaedic Hospital Speising, Laboratory for Gait and Human Movements, Vienna, Austria

O 004 ☆ Predictive simulations of common gait features in children with Duchenne muscular dystrophy

Ines Vandeckerckhove¹, Dhruv Gupta², Lars D'Hondt³, Marleen Van den Hauwe^{1,3}, Anja Van Campenhout^{4,5}, Liesbeth De Waele^{3,4}, Nathalie Goemans^{3,4}, Kaat Desloovere^{1,6}, Friedl De Groot²

¹ KU Leuven, Rehabilitation Sciences, Leuven, Belgium

² KU Leuven, Movement Sciences, Leuven, Belgium

³ University Hospitals Leuven, Child Neurology, Leuven, Belgium

⁴ KU Leuven, Development and Regeneration, Leuven, Belgium

⁵ University Hospitals Leuven, Orthopedics, Leuven, Belgium

⁶ University Hospitals Leuven, Clinical Motion Analysis Laboratory, Leuven, Belgium

O 005 ☆ Fall risk management through personalised machine learning in wearables

Sarah Arnold^{1,2}, Raz Tamir³, Nathaniel Shimon³, Yarden Rotem³, Greg Newman², Melissa Kistner⁴

¹ Stellenbosch University, Department of Exercise- Sport and Lifestyle Medicine, Stellenbosch, South Africa

² LifeQ, Special Projects, Stellenbosch, South Africa

³ Owlytics Healthcare, Data Science, Tel Aviv, Israel

⁴ LifeQ, Data Science, Cape Town, South Africa

O 006 Person-specific scaling of maximal isometric strength based on resistance training exercises influences ankle, knee and hip forces during walking

Morten Bilde Simonsen¹, Bjørn Keller Englund², Mathias Kristiansen³, Michael Skipper Andersen⁴

¹ Aalborg University, Department of Materials and Production, Aalborg, Denmark

² Anybody Technology, a/s, Aalborg, Denmark

³ Aalborg University, Department of Health Science and Technology, Aalborg, Denmark

⁴ Aalborg University, Center for Mathematical Modeling of Knee Osteoarthritis, Aalborg, Denmark

Sponsors' Pitches – 10 mins

10:25–10:35, Olympia Hall

Chairs: Hans Kainz (Austria), Maria B. Sánchez (United Kingdom)

Coffee Break

10:35–11:00, Olympia Foyer

2) Pediatric neurology

Plenary Session:

11:00–12:15, Olympia Hall

Chairs: Annemieke Buizer (Netherlands), Andreas Kranzl (Austria)

O 007 ☆ Effect of selective dorsal rhizotomy on muscle morphology, spasticity, gait and gross motor function in children with spastic cerebral palsy

Ineke Verreydt¹, Anja Van Campenhout^{2,3}, Guy Molenaers^{2,3}, Britta Hanssen¹, Nathalie De Beukelaer^{1,4}, Ines Vandekerckhove¹, Eirini Papageorgiou¹, Tjil Dewit^{1,5}, Catherine Huenaerts⁵, Kaat Desloovere^{1,5}

¹ KU Leuven, Department of Rehabilitation Sciences, Leuven, Belgium

² KU Leuven, Department of Development and Regeneration- Faculty of Medicine, Leuven, Belgium

³ University Hospitals Leuven, Pediatric Orthopedics- Department of Orthopedics, Leuven, Belgium

⁴ University of Geneva, Departement of Surgery- Faculty of Medicine, Geneva, Switzerland

⁵ University Hospitals Leuven, Clinical Motion Analysis Laboratory, Leuven, Belgium

O 008 Alterations in dynamic balance when stepping to a target in children with cerebral palsy

Nina Jacobs¹, Ann Halleman², Els Ortibus³, Kaat Desloovere⁴, Pieter Meyns¹

¹ Hasselt University, Rehabilitation Research REVAL, Diepenbeek, Belgium

² University of Antwerp, Rehabilitation sciences and physiotherapy - research group MOVANT, Wilrijk, Belgium

³ University Hospital of Leuven, Pediatrics, Leuven, Belgium

⁴ KU Leuven, Rehabilitation sciences, Leuven, Belgium

O 009 Proprioceptive-perception threshold is impaired in cerebral palsy and is associated with worse balance performance

Harri Piitulainen^{1,2}, Maria Sukanen¹, Taija Finni¹, Francesco Cenni¹

¹ University of Jyväskylä, Faculty of Sport and Health Sciences, Jyväskylä, Finland

² University of Helsinki and Helsinki University Hospital, Department of Child Neurology- New Children's Hospital, Helsinki, Finland

O 010 Accurate estimation of late swing biceps femoris, semitendinosus but not semimembranosus lengths is possible without using musculoskeletal modelling software

Colm Daly¹, Damien Kiernan¹

¹ Central Remedial Clinic, Gait Laboratory, Dublin, Ireland

O 011 Does genetic inheritance pattern affect objective gait scores in pediatric patients with hereditary spastic paraparesis?

Lane Wimberly¹, Elizabeth Bunkell², Cinthya Meza², Kelly Jeans²

¹ Scottish Rite Hospital, Orthopaedic Surgery, Dallas, USA

² Scottish Rite Hospital, Movement Analysis Laboratory, Dallas, USA

O 012 Pattern-specific effects of botulinum neurotoxin type A injections and selective dorsal rhizotomy on gait in children with spastic cerebral palsy

Eirini Papageorgiou¹, Els Ortibus², Guy Molenaers³, Anja Van Campenhout², Kaat Desloovere⁴

¹ KU Leuven, Rehabilitation Sciences, Pellenberg, Belgium

² KU Leuven, Development and Regeneration, Leuven, Belgium

³ University Hospitals Leuven, Orthopedics, Leuven, Belgium

⁴ KU Leuven, Rehabilitation Sciences, Leuven, Belgium

O 013 Reference centile curves for muscle volume and strength of lower-limb muscles of typically developing children aged 0.5–18 years

Ines Vandekerckhove¹, Britta Hanssen¹, Nicky Peeters¹, Nathalie De Beukelaer^{1,2}, Tijl Dewit^{1,3}, Marleen Van den Hauwe^{1,4}, Anja Van Campenhout^{5,6}, Liesbeth De Waele^{4,5}, Friedl De Groote⁷, Kaat Desloovere^{1,3}

¹ KU Leuven, Rehabilitation Sciences, Leuven, Belgium

² University of Geneva, Departement of Surgery, Geneva, Switzerland

³ University Hospitals Leuven, Clinical Motion Analysis Laboratory, Pellenberg, Belgium

⁴ University Hospitals Leuven, Child Neurology, Leuven, Belgium

⁵ KU Leuven, Development and Regeneration, Leuven, Belgium

⁶ University Hospitals Leuven, Orthopedics, Leuven, Belgium

⁷ KU Leuven, Movement Sciences, Leuven, Belgium

Keynote Lecture 1

12:15–13:00, Olympia Hall

Physiology of Spasticity in Cerebral Palsy – Role of Keyhole Interlaminar Dorsal Rhizotomy

George Georgoulis (Greece)

Chair: Georgios Gkrimas (Greece)

Vicon Industry Workshop

13:00–13:30, Olympia Hall

Lunch & Posters I.

21. 9. 2023, 13:10–14:15, Kallirhoe Hall

Group 1: Pediatric neurology

Group 2: Normative studies

Group 4: Adult neurology and elderly

Group 5: Imaging and anatomy

Group 6: Sports

Group 9: Musculoskeletal disorders

Group 10: Modelling and simulation

Group 13: Foot and ankle

3) Modelling and simulation II

Parallel Session:

14:15–15:30, Olympia Hall

Chairs: Friedl De Groote (Belgium), Lizeth Sloot (Germany)

O 014 Effect of pelvic retroversion on hamstring lengths in adult spinal deformity patients in standing position and during gait

Guillaume Rebeyrat¹, Wafa Skalli¹, Rami El Rachkidi², Abir Massaad², Mohmad Karam², Helene Pillet¹, Ayman Assi^{1,2}

¹ *Arts et Métiers, Institut de Biomechanique Humaine Georges Charpak, Paris, France*

² *Faculty of Medicine- University of Saint-Joseph, Laboratory of Biomechanics and Medical Imaging, Beirut, Lebanon*

O 015 A population-based approach to study the effect of tibiofemoral geometrical features on knee joint loading

Miel Willems¹, Bryce Killen¹, Giacomo Di Raimondo¹, Christophe Van Dijk², Roel Wirix-Speetjens², Ilse Jonkers¹

¹ *KU Leuven, Movement Sciences, Leuven, Belgium*

² *Materialise, nv, Leuven, Belgium*

O 016 Could initial guess of the ligament parameters during estimation procedures affect post-operative predictions of knee laxity following total knee arthroplasty?

Ilias Theodorakos¹, Michael Skipper Andersen¹

¹ *Aalborg University, Department of Materials and Production, Aalborg, Denmark*

O 017 Internal lower limb rotation increases patella cartilage pressure in individuals with patellofemoral instability

Bernhard Guggenberger^{1,2,3}, Brian Horsak⁴, Andreas Habersack^{1,5}, Colin Smith⁶, Martin Svehlik¹, Hans Kainz²

¹ *Department of Orthopaedics and Trauma, Medical University of Graz, Graz, Austria*

² *Neuromechanics Research Group, Department of Biomechanics- Kinesiology and Computer Science in Sport- Centre for Sport Science and University Sports, Vienna, Austria*

³ *Institute of Physiotherapy, JOANNEUM University of Applied Sciences, Graz, Austria*

⁴ *Center of Digital Health and Social Innovation, St. Pölten University of Applied Sciences, St. Pölten, Austria*

⁵ *Institute of Human Movement Science, Sport and Health- University of Graz, Graz, Austria*

⁶ *Department of Biomedical Engineering, Steadman Philippon Research Institute, Vail- CO, USA*

O 018 Musculoskeletal modelling informed muscle coordination re-training to reduce knee joint loads

Hans Kainz¹, Willi Koller¹, Elias Wallnöfer¹, Gabriel Mindler², Andreas Kranz³

¹ *University of Vienna, Centre for Sport Science and University Sports- Department of Biomechanics- Kinesiology and Computer Science in Sport, Vienna, Austria*

² *Orthopaedic Hospital Speising, Department of Paediatric Orthopaedics, Vienna, Austria*

³ *Orthopaedic Hospital Speising, Laboratory for Gait and Movement Analysis, Vienna, Austria*

O 019 A single inertial measurement unit-based deep learning model for predicting knee angles during running

Vaibhav Shah^{1,2}, Philippe C. Dixon^{2,3}

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O 020 Towards a laxity protocol for in vivo applications

Ilias Theodorakos¹, Michael Skipper Andersen¹

¹ Aalborg University, Department of Materials and Production, Aalborg, Denmark

4) Stability, proprioception & motor control

Parallel Session:

14:15–15:30, Attica

Chairs: Neil Postans (United Kingdom), Pieter Meyns (Belgium)

O 021 Designing a novel protocol to investigate mechanisms of falls in children with cerebral palsy, informed by lived experiences

Rebecca Louise Walker¹, Tom D O'Brien¹, Gabor J Barton¹, Bernie Carter², David M Wright³, Richard J Foster¹

¹ Liverpool John Moores University, Research Institute for Sport and Exercise Sciences, Liverpool, United Kingdom

² Edge Hill University, Faculty of Health- Social Care and Medicine, Ormskirk, United Kingdom

³ Alder Hey Children's NHS Foundation Trust, North West Movement Analysis Centre, Liverpool, United Kingdom

O 022 Young and older adults show similar anticipatory postural adjustments when stepping with different task priorities

Hannah Carey¹, Wouter Muijres¹, Friedl De Groot¹

¹ KU Leuven, Department of Movement Sciences, Leuven, Belgium

O 023 Kinematic limitations during obstacle-crossing in adolescent idiopathic scoliosis

Maria Rassam¹, Karim Hoyek¹, Rony El Hayeck¹, Georges Haddad¹, Emmanuelle Wakim¹, Elio Mekhael¹, Nabil Nassim¹, Ismat Ghanem¹, Rami El Rachkidi¹, Ayman Assi¹

¹ Faculty of Medicine- University of Saint-Joseph, Laboratory of Biomechanics and Medical Imaging, Beirut, Lebanon

O 024 Mimicking slipping responses using a novel mechanical perturbation algorithm

Marina Geissmann¹, Sandra Moessner¹, Linard Filli^{1,2}

¹ Balgrist Campus, Swiss Center for Movement Analysis, Zurich, Switzerland

² University Hospital Balgrist, 2 Spinal Cord Injury Center, Zurich, Switzerland

O 025 The use of a novel assessment protocol for the knee joint velocity proprioceptive sense to investigate motor learning abilities

Anthi Kellari¹, Eumorphia Papapostolou¹, Euaggelia Papadimou¹, Zacharias Dimitriadis¹, Eleni Kapreli¹, George Koumantakis², Nikolaos Strimpakos¹, Asimakis Kanellopoulos¹

¹ University of Thessaly, Physiotherapy, Lamia, Greece

² University of West Attica, Physiotherapy, Athens, Greece

O 026 Investigation the relationship between squat performance test, respiratory muscle strength, respiratory function, and cardiorespiratory endurance in children with cerebral palsy

Tuana Gerede¹, Kubra Onerge^{1,2,3}, Elif Cankatar¹, Ozturk Bilge Nur¹, Rukiye Sert⁴, Nazif Ekin Akalan^{1,3}, Shavkat Nadiy^{3,5}, Halenur Evrendilek^{1,3}, Fuat Bilgili⁶

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⁵ Bogazici University, Institute of Biomedical Engineering, Istanbul, Turkey

⁶ Istanbul University, Istanbul Faculty of Medicine- Orthopaedics and Traumatology Department, Istanbul, Turkey

O 027 Validation of three optical marker models in recordings of dynamic 3D angular knee movements using radiostereometric analysis as a reference

Anna Fändriks¹, Roland Zügner¹, Bitu Shareghi¹, Johan Kärrholm¹, Roy Tranberg¹

¹ Institute of Clinical Sciences, Department of Orthopaedics, Gothenburg, Sweden

5) Musculoskeletal disorders

Parallel Session:

14:15–15:30, Templars Hall

Chairs: Jaap Harlaar (Netherlands), Colm Daly (Ireland)

O 028 Kinematic strategies adopted by adult spinal deformity patients during daily life activities

Elma Ayoub¹, Ali Rteil¹, Rami El Rachkidi¹, Celine Chaaya¹, Maria Saade¹, Elena Jaber¹, Elio Mekhael¹, Nabil Nassim¹, Abir Massaad¹, Ayman Assi¹

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O 029 Postural and kinematic changes in the transition from sit-to-stand position in adolescent idiopathic scoliosis

Nabil Nassim¹, Elio Mekhael¹, Rami El Rachkidi¹, Carlo El Khoury¹, Rony El Hayek¹, Mohamad Karam¹, Abir Massaad¹, Bilal Ramadan¹, Ismat Ghanem¹, Ayman Assi¹

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O 030 Exploring the differences in muscle activation of unilateral transtibial amputees during rehabilitation exercises and walking

Sarah Arnold¹, Laura-Anne Furlong², Lara Grobler¹, Ranel Venter¹

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² University of Limerick, Sport and Exercise Biomechanics, Limerick, Ireland

O 031 The effects of a posterior cruciate ligament injury on the knee joint biomechanics during walking

Lucia Donno¹, Carlo Albino Frigo¹

¹ Politecnico di Milano, Department of Electronics- Information and Bioengineering, Milan, Italy

O 032 Are gait kinematics and muscle activity influenced by mosaicism type in Fragile X Syndrome?

Fabiola Spolaor¹, Annamaria Guiotto¹, Piatkowska Weronika¹, Elisa Di Giorgio², Valentina Liani², Roberta Polli², Garazi Casillas Martinez³, Alessandra Murgia², Zimi Sawacha⁴

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O 033 Alteration of gait characteristics in patients with adult spinal deformity

Stephanie Huysmans¹, Rachel Senden², Eva Jacobs¹, Paul Willems³, Rik Marcellis², Mark van den Boogaart¹, Kenneth Meijer³, Paul Willems¹

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² Maastricht University Medical Center+, Department of Physiotherapy, Maastricht, Netherlands

³ Maastricht University Medical Center+, Department Nutrition and Movement Sciences, Maastricht, Netherlands

O 034 Objectively evaluated joint function and patient-reported pain are associated with differences in the proteomic landscape of knee osteoarthritis

Josefine Eriksson Nail^{1,2}, Margareta Hedström^{3,4}, Aisha Ahmed⁵, Morten Bilde Simonsen^{6,7}, Eva W Broström¹, Helena Erlandsson Harris⁸, Akos Vegvari⁹, Cecilia Aulin⁸

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⁴ Karolinska University Hospital, Trauma and Reparative Medicine Theme, Stockholm, Sweden

⁵ Karolinska Institutet, Department of Molecular Medicine and Surgery, Stockholm, Sweden

⁶ Aalborg University, Department of Materials and Production, Aalborg, Denmark

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⁹ Karolinska Institutet, Division of Chemistry I Department of Medical Biochemistry and Biophysics, Stockholm, Sweden

Coffee Break

15:30–16:00, Olympia Foyer

6) Sports

Parallel Session:

16:00–17:30, Olympia Hall

Chairs: Zimi Sawacha (Italy), Sarah Campos (Germany)

O 035 Quantitative gait analysis of patients with unilateral juvenile osteochondritis dissecans of the knee: Comparison with the contralateral side and controls

Mathieu Lalumière¹, Thierry Pauyo², Jean-François Girouard¹, Reggie Charles Hamdy², Louis-Nicolas Veilleux¹

¹ Shriners Hospitals for Children – Canada, Motion Analysis Center, Montreal, Canada

² Shriners Hospitals for Children – Canada, Medecine, Montreal, Canada

O 036 Impact of subject's physical properties on joint biomechanics: Hypermobility alters lower extremity biomechanics during knee-bearing activity

Shavkat Kuchimov^{1,2}, Mehmed Özkan¹, Adnan Apti^{2,3}, Nazif Ekin Akalan^{2,3}, Burcu Semin Akel^{2,3}, Karsten Hollander⁴

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⁴ MSH Medical School Hamburg, Institute of Interdisciplinary Exercise Science and Sports Medicine, Hamburg, Germany

O 037 Comparison of neuromuscular and abductor strengthening exercises in the hip abductor muscle strength: A randomized controlled trial

Sofia Pastrouma¹, Filippas Kasiotis¹, Aikaterini - Evanthia Gkanatsiou¹, Natalia Kitsouli¹, Konstantinos Vassisi¹, Zacharias Dimitriadis¹, Savvas Spanos¹, Ioannis Poulis¹

¹ University of Thessaly, Physiotherapy, Lamia, Greece

O 038 Altered biceps femoris muscle lengths in athletes who have returned to full participation in sport following sprint related hamstring injury

Colm Daly¹, Hazel Ni Chathasaigh², Sean Clarke², Dylan Morrissey³, Ulrik McCarthy Persson²

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³ Queen Mary University of London, Sports and Exercise Medicine- WHRI, London, United Kingdom

O 039 Hurdle step test: Convergent validity and ability to discriminate between subjects with different levels of postural stability (preliminary results)

Maria Bhudarally¹, Tiago Atalaia², João Abrantes³, Pedro Aleixo¹

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² Escola Superior de Saúde da Cruz Vermelha Portuguesa, Physiotherapy, Lisboa, Portugal

³ CICANT- Universidade Lusófona, MovLab - Biomechanics, Lisboa, Portugal

O 040 Validity and reliability of the portable Kforce plates system with the use of a smartphone application for measuring countermovement jump

George Plakoutsis¹, Dimitrios Zapantis¹, Eirini-Maria Panagiotopoulou¹, Eleftherios Paraskevopoulos¹, Maria Papandreou¹

¹ University of West Attica, Physiotherapy, Athens, Greece

O 041 A comparison of machine learning architectures for determining ground contact timings in overground and treadmill gait

Sailee Sangsiri¹, Krista Voblakari¹, Taina Finni¹, Timo Rantalainen¹, Neil Cronin¹

¹ University of Jyväskylä, Neuromuscular Research Centre, Jyväskylä, Finland

O 042 CrossFit® to improve gross motor function and gait in adolescents and young adults with unilateral cerebral palsy: a pilot study

Michelle Widmer¹, Alice Minghetti², Jacqueline Romkes¹, Morgan Sangeux¹, Cornelia Neuhaus¹, Bastian Widmer¹, Elke Viehweger¹

¹ University Children's Hospital Basel, Kinderorthopädie, Basel, Switzerland

² University Basel, Department of Sport- Exercise and Health, Basel, Switzerland

7) Movement analysis methodology I

Parallel Session:

16:00–17:40, Attica

Chairs: Han Houdijk (Netherlands), Matthias Hösl (Germany)

O 043 Foot function after calcaneus fracture assessed by application of unsupervised machine learning on pedobarographic gait data

Moritz Kraus¹, Isabella Klöpfer-Krämer², Mischa Mühling², Johannes Gabel³, Peter Augat², Andreas Brand²

¹ Muskuloskelettales Universitätszentrum München- LMU Klinikum- Schulthess Klinik Zürich, Trauma Surgery, München, Germany

² BG Unfallklinik Murnau- Paracelsus Medical University- Salzburg- Austria, Institute for Biomechanics, Murnau am Staffelsee, Germany

³ BG Unfallklinik Murnau- Department of Foot and Ankle Surgery, Murnau am Staffelsee, Germany

O 044 Reliability of forefoot-to-rearfoot angles using a two-segment biomechanical foot model (CGM 2.4)

Jesper Bencke¹, Anders Holsgaard-Larsen², Gudrun Jonsdottir³, Camilla K. Jørgensen³, Liat E.P. Svanholm³, Niels J. Nedergaard¹

¹ Copenhagen University Hospital, Human Movement Analysis Laboratory sect.247, Hvidovre, Denmark

² University of Southern Denmark, Department of Clinical Research, Odense, Denmark

³ University College Copenhagen, Department of Physiotherapy and Occupational Therapy, Copenhagen, Denmark

O 045 openOFM: an open-source implementation of the multi-segment Oxford Foot Model

Philippe Dixon¹, Eloodie Drew², Sean McBride³, Samuel Cheng⁴, Marian Harrington⁵, Julie Stebbins⁵, Amy Zavatsky⁶

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⁵ Nuffield Orthopaedic Centre Oxford University Hospitals NHS Foundation Trust, Oxford Gait Laboratory, Oxford, United Kingdom

⁶ University of Oxford, Engineering Science, Oxford, United Kingdom

O 046 Idiopathic clubfoot patients produce less ankle power during hopping when compared to typically developing children

Saskia Wijnands^{1,2}, Lianne Grin^{1,3}, Lianne van Dijk³, Arnold Besselaar^{2,4}, Marieke van der Steen^{2,4}, Benedicte Vanwanseele^{1,3}

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³ Fontys University of Applied Sciences, Department of Health Innovation and Technology, Eindhoven, Netherlands

⁴ Catharina Hospital, Department of Orthopaedic Surgery & Trauma, Eindhoven, Netherlands

O 047 A comparison of 2 models: Plug in Gait and pyCGM2 1.0

Corey Joseph¹, Nicolaos Darras¹

¹ Monash Health, Clinical Gait Analysis Service, Cheltenham, Australia

O 048 A comparative analysis of kinematic simulation results obtained by manually and automated scaled OpenSim models during walking – preliminary findings

Jana Holder^{1,2}, Felix Stief^{2,3}, Stefan van Drongelen^{2,3}, Brian Horsak^{4,5}

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⁵ St. Pölten University of Applied Sciences, Institute of Health Sciences, St. Pölten, Austria

O 049 Towards personalized gait rehabilitation: How robustly can we identify personal gait signatures with machine learning?

Djordje Slijepcevic¹, Fabian Horst², Marvin Simak², Wolfgang Immanuel Schöllhorn²,

Matthias Zeppelzauer¹, Brian Horsak³

¹ St. Pölten University of Applied Sciences, Institute of Creative Media Technologies, St. Pölten, Austria

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O 050 Effects of simulated healthy gait patterns in children with idiopathic torsion deformities

Basilio Goncalves¹, Willi Koller¹, Kira Schmitz¹, Arnold Baca¹, Hans Kainz¹, Andreas Kranz²

¹ University of Vienna, Centre for Sport Science and University Sports, Wien, Austria

² Orthopaedic Hospital Speising, Laboratory of Gait and Motion Analysis, Vienna, Austria

O 051 Does a single segment trunk model adequately reveal trunk movements for a simple reaching and grasping movement?

Maria B. Sánchez¹, Andy Sanderson², Emma Hodson-Tole³

¹ Manchester Metropolitan University, Health Professions, Manchester, United Kingdom

² Manchester Metropolitan University, Sport and Exercise Sciences, Manchester, United Kingdom

³ Manchester Metropolitan University, Life Sciences, Manchester, United Kingdom

O 052 How does flexible pes planus affect jumping performance and lower extremity biomechanics during countermovement jump in volleyball players?

Eyyub Gece¹, Müjdat Yildız¹, Nazif Ekin Akalan^{1,2}, Burcu Semin Akel^{1,2}, Shavkat Kuchimov^{2,3}, Kübra Önerge^{1,2,4}, Halenur Evrendilek^{1,2,5}

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⁵ Istanbul University, Cerrahpasa- Graduate School of Health Sciences- Division of Physiotherapy and Rehabilitation, Istanbul, Turkey

8) Pediatrics and neuro-pediatrics

Parallel Session:

16:00–17:40, Templars Hall

Chairs: Britta Hanssen (Belgium), Dimitrios Mataxiotis (Greece)

O 053 Metabolic cost reductions are associated with reduced muscle activity when walking with a robotic exosuit in patients with Cerebral Palsy

Max Thurston^{1,2}, Harri Piitulainen¹, Ivan Vujaklija³, Janne Avela¹, Juba-Pekka Kulmala²

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² New Children's Hospital, Motion Laboratory, Helsinki, Finland

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O 054 Age related changes in lower-limb joint coordination during gait in children with bilateral cerebral palsy

Damien Kiernan¹, Ailish Malone²

¹ Central Remedial clinic, Gait Laboratory, D3, Ireland

² Royal College of Surgeons in Ireland, School of Physiotherapy, Dublin, Ireland

O 055 Children with cerebral palsy with reduced selective control show stereotyped muscle synergies across activities

Miriam Febrer-Nafria¹, Hannah Carey², Jente Willaert², Bram Van Den Bosch³, Kaat Desloovere³, Anja Van Campenhout^{4,5}, Friedl De Groot²

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⁴ UZ Leuven, Department of Orthopaedic Surgery, Leuven, Belgium

⁵ KU Leuven, Department of Development and Regeneration, Leuven, Belgium

O 056 Immediate influence of split-belt treadmill training on bilateral lower limb muscle synergies in individuals with unilateral cerebral palsy

Gilad Sorek¹, Aryeh Friedman^{1,2,3}, Marije Goudriaan^{4,5,6}, Jason Friedman², Simon-Henri Schless^{1,3}

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⁶ Amsterdam UMC, Department of Rehabilitation Medicine, Amsterdam, Netherlands

O 057 Reduced reciprocal inhibition during passive spasticity assessments is related with increased muscle co-activation during perturbations of standing balance

Jente Willaert¹, Lena H. Ting², Anja Van Campenhout³, Kaat Desloovere⁴, Friedl De Groot¹

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⁴ KU Leuven / UZ Leuven, Department of Rehabilitation Sciences, Leuven, Belgium

O 058 Influence of non-acute musculoskeletal pain on gait analysis biomarkers in individuals with cerebral palsy

Gilad Sorek¹, Marije Goudriaan^{2,3,4}, Itai Schurr⁵, Sharon Eylon^{1,6}, Simon-Henri Schless^{1,5}

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O 059 Establishing the clinical utility of walk-DMC to measure motor control following pediatric traumatic brain injury

Alyssa Spomer¹, Nanette Aldahondo², Andy Ries³, Michael Schwartz³

¹ Gillette Children's Hospital, Research, St. Paul, USA

² Gillette Children's Hospital, Physical Medicine and Rehabilitation, St. Paul, USA

³ Gillette Children's Hospital, Center for Gait and Motion Analysis, St. Paul, USA

O 060 Variability of gait analysis in children with Cerebral Palsy across different conditions

Laure Everaert¹, Tijl Dewit^{1,2}, Catherine Huenaerts², Lauraine Staut¹, Heleen Adams², Luc Labey³, Anja Van Campenhout^{4,5}, Kaat Desloovere^{1,2}

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O 061 Idiopathic toe walkers: Conservative or surgical treatments?

Alice Bonnefoy-Mazure¹, Marys Franco-Carvalho¹, Camille Leroquais¹, Geraldo De Coulon², Pierre Lascombes³, Stéphane Armand¹

¹ Geneva University Hospitals and Geneva University, Kinesiology Laboratory - Orthopedic surgery, Geneva, Switzerland

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³ Nancy University Hospitals and Nancy University, Paediatric Orthopaedics of the University of Medicine, Nancy, France

ESMAC Annual General Assembly

17:40–18:40, Olympia Hall

Motek User Group Meeting

18:40–20:00, Olympia Hall

Friday 22 September

Charity Run

07:00–08:00, Zappeion Megaron

9) Foot and ankle

Plenary Session:

08:35–10:25, Olympia Hall

Chairs: Julie Stebbins (United Kingdom), Stéphane Armand (Switzerland)

O 062 ☆ The predictive value of multi-segment foot kinetics in the development of foot deformities in cerebral palsy

Wouter Schallig^{MS^{1,2}}, *Astrid Bieger*¹, *Melinda Witbreuk*³, *Annemieke Buizer*^{1,2,4}, *Marjolein van der Krogt*¹

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O 063 ☆ Subtalar joint axis alignments in pathological feet of children with cerebral palsy

Erik Meilak^{1,2}, *Ruud Wellenberg*³, *Wouter Schallig*^{2,4}, *Andrew Roberts*⁵, *Melinda Witbreuk*⁶, *Annemieke Buizer*^{2,4}, *Mario Maas*³, *Marjolein van der Krogt*^{2,4}, *Luca Modenese*⁷, *Caroline Stewart*^{1,5}

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O 064 Subtalar joint moments of children with cerebral palsy

Erik Meilak^{1,2}, *Luca Modenese*³, *Roberts Andrew*⁴, *Stebbins Julie*^{5,6}, *Chadwick Edward*⁷, *Stewart Caroline*^{1,4}

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⁷ University of Aberdeen, School of Engineering, Aberdeen, United Kingdom

O 065 Human-in-the-loop optimization of rocker shoes via different cost functions during walking

Thijs Tankink¹, Han Houdijk¹, Raffaella Carloni², Juha- M. Hijmans³

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² University of Groningen, Faculty of Science and Engineering – Bernoulli Institute for Mathematics- Computer Science and Artificial Intelligence, Groningen, Netherlands

³ University of Groningen, University Medical Center Groningen- Department of Rehabilitation Medicine, Groningen, Netherlands

O 066 Robustness of CGM2.4 medial-lateral intermediate cuneiform marker misplacement on forefoot-to-rearfoot angles

Niels Nedergaard¹, Anders Holsgaard-Larsen^{2,3}, Gudrun Jonsdóttir⁴, Camilla K. Jørgensen⁴, Liat E.P. Svanholm⁴, Jesper Bencke¹

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O 067 Children diagnosed with idiopathic toe walking – altered treatment strategy when gait analysis is added to the decision-making

Tina Udemark Pasgaard¹, Sidsel Hald Rahlf², Julie Ladeby Erichsen², Christian Førgemann², Bjarke Viberg³, Anders Holsgaard-Larsen²

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³ Hospital Lillebaelt – University Hospital of Southern Denmark, Department of Orthopaedic Surgery and Traumatology, Kolding, Denmark

O 068 Objectifying the Coleman Block Test using Oxford foot model for the pes cavovarus foot: Is it worth the effort?

Sonia D'Souza PhD¹, Richard Doepner¹

¹ Olgahospital- Klinikum Stuttgart, Gaitlab- Orthopedics, Stuttgart, Germany

O 069 The effect of varus foot deformities on muscle moment arms in children with cerebral palsy

Gaia Van Den Heuvel^{1,2,3}, Wouter Schallig^{2,3}, Marjolein van der Krogt^{2,3}, Ruud Wellenberg⁴, Mario Maas⁴, Annemieke Buizer^{2,3,5}, Ajay Seth¹

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⁵ Emma Children's Hospital, Amsterdam UMC, Amsterdam, Netherlands

O 070 How does the functionally determined joint center location between the forefoot and hindfoot differ in flatfeet compared to reference feet?

Sarah Campos¹, Firooz Salami¹, Sebastian I. Wolf¹

¹ Motion Analysis Lab, Department of Orthopedics and Trauma Surgery, Heidelberg, Germany

O 071 Articular ankle joint loading during dynamic activities

Barbara Postolka¹, Bryce A. Killen¹, Hannelore Boey¹, Jos Vander Sloten², Ilse Jonkers¹

¹ KU Leuven, Department of Movement Sciences Human Movement Biomechanics Research Group, Leuven, Belgium

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Moveshelf Presentation

10:25–10:30, Olympia Hall

Coffee Break

10:30–11:00, Olympia Foyer

10) Markerless motion analysis

Plenary Session:

11:00–12:15, Olympia Hall

Chairs: Marjolein van der Krogt (Netherlands), Sebastian Wolf (Germany)

O 072 ☆ Concurrent assessment of a smartphone-based markerless and marker-based motion capture system in pathological gait

Brian Horsak¹, Anna Eichmann², Kerstin Lauer-Maier², Kerstin Prock¹, Bernhard Dumphart³

¹ St. Pölten University of Applied Sciences, Center for Digital Health and Social Innovation, St. Pölten, Austria

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³ St. Pölten University of Applied Sciences, Institute of Health Sciences, St. Pölten, Austria

O 073 Can markerless motion tracking replace marker-based clinical gait analysis in children with cerebral palsy?

Koen Wishaupt¹, Wouter Schallig^{1,2}, Marleen van Dorst^{1,2}, Annemieke Buizer^{1,2,3},

Marjolein van der Krogt^{1,2}

¹ Amsterdam UMC, Rehabilitation Medicine, Amsterdam, Netherlands

² Vrije Universiteit Amsterdam, Human Movement Sciences, Amsterdam, Netherlands

³ Amsterdam UMC, Emma Children's Hospital, Amsterdam, Netherlands

O 074 The effect of the number of labelled frames on the accuracy of 2D markerless pose estimation (DeepLabCut) during treadmill walking

Maud Van Den Bogaart¹, Maaïke M. Eken², Rachel H. J. Senden³, Rik G. J. Marcellis³, Kenneth Meijer⁴, Pieter Meyns¹, Hans M. N. Essers⁴

¹ Hasselt University, REVAL Rehabilitation Research Center, Diepenbeek, Belgium

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³ Maastricht University Medical Centre+, Department of Physiotherapy, Maastricht, Netherlands

⁴ Maastricht University Medical Centre+, Department of Nutrition and Movement Sciences, Maastricht, Netherlands

O 075 Reliability of an AI driven 3-dimensional markerless motion capture system for on the field sport applications

Giulio Rigoni¹, Niccolò Monaco², Gavazi Casillas Martinez^{1,3}, Federica Cibin², Fabiola Spolaor¹, Annamaria Guiotto¹, Zimi Sawacha^{1,4}

¹ University of Padova, Dept of Information Engineering, Padova, Italy

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³ Mondragon Unibertsitatea, Faculty Of Engineering, Mondragón, Spain

⁴ University of Padova, Dept of Medicine, Padova, Italy

O 076 Assessing single camera markerless motion capture during upper limb activities of daily living

Bradley Scott¹, Edward Chadwick², Mhairi McInnes², Dimitra Blana¹

¹ University of Aberdeen, School of Medicine- Medical Sciences and Nutrition, Aberdeen, United Kingdom

² University of Aberdeen, School of Engineering, Aberdeen, United Kingdom

O 077 Comparison of lower-body 3D-kinematics between Theia3D markerless and the CAST model marker-based systems during pathological gait in adults and children

Sonia D'Souza PhD¹, Richard Doepner¹, Vincent Fohanno²

¹ Olgahospital- Klinikum Stuttgart, Gaitlab- Orthopedics, Stuttgart, Germany

² Qualisys AB, Research and Development, Gothenburg, Sweden

O 078 Validity of deep learning based motion capture using DeepLabCut to assess proprioception

Maud Van Den Bogaart¹, Nina Jacobs¹, Guy Molenaers², Ann Halleman³, Pieter Meyns¹

¹ Hasselt University, REVAL Rehabilitation Research Center, Diepenbeek, Belgium

² KU Leuven, Department of Development and Regeneration, Leuven, Belgium

³ University of Antwerp, Department of Pediatric Neurology, Antwerp, Belgium

Contemplas Presentation

12:15–12:20, Olympia Hall

Movella Presentation

12:20–12:25, Olympia Hall

Keynote Lecture 2

12:25–13:10, Olympia Hall

Artificial Intelligence for Movement Analysis

Lukasz Kidziński (Poland)

Chair: Kaat Desloovere (Belgium)

Lunch & Posters II.

22. 9. 2023, 13:10–14:15, Kallirhoe Hall

Group 3: Movement analysis methodology

Group 7: Prosthetics, orthotics and assistive devices

Group 8: Balance

Group 11: Upper extremity

Group 12: Coordination and motor control

11) Movement analysis methodology II

Parallel Session:

14:15–15:30, Olympia Hall

Chairs: Morgan Sangeux (France), Patricia Van De Walle (Belgium)

O 079 Innovative use of 4D scanner for gait analysis of neurological disorders: A case study

Salvador Pitarch-Corresa¹, Helios De Rosario - Martínez², Juan López - Pascual², Rosa Porcar - Seder³, Ana Ruescas - Nicolau⁴, Fermín Basso - Della Vedova²

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³ Instituto de Biomecánica de Valencia - Universitat Politècnica de València, Market development area, Valencia, Spain

⁴ Instituto de Biomecánica de Valencia - Universitat Politècnica de València, 3D Anthropometry, Valencia, Spain

O 080 Comparing the accuracy of machine learning models for accelerometer-based movement measurements

Orhan Ozturk¹, Derya Ozer Kaya¹, Aytug Onan²

¹ University of İzmir Katip Celebi- Faculty of Health Science, Physiotherapy and Rehabilitation, İzmir, Turkey

² University of İzmir Katip Celebi- Faculty of Engineering And Architecture, Software Department, İzmir, Turkey

O 081 Does using the hip joint distance (x-ray) as an input change the kinematic, kinetic output and is this clinically relevant?

Andreas Kranz¹, Grobbschegg Leonore², Attwenger Bernhard¹, Durstberger Sebastian³, Koppenwallner Laurin Xavier¹, Unglaube Fabian¹

¹ Orthopaedisches Spital Speising, Labor fuer Gang- und Bewegungsanalyse, Vienna, Austria

² University of Applied Sciences Technikum Wien, Biomedical Engineering, Vienna, Austria

³ Health Sciences, FH Campus Wien, Vienna, Austria

O 082 A reference frame alignment method for the consistent interpretation of kinematic signals

Ariana Ortigas Vázquez^{1,2}, William R. Taylor³, Barbara Postolka³, Pascal Schütz³, Allan Maa^{1,2}, Matthias Woiczinski², Thomas M. Grupp^{1,2}, Adrian Sauer^{1,2}

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³ ETH Zurich, Laboratory for Movement Biomechanics, Zurich, Switzerland

O 083 Optimality principles of perturbed and unperturbed human squat motions using inverse optimal control

Mahsa Parsapour¹, Dana Kulić², Katja Mombaur³

¹ University of Waterloo, Electrical and Computer Engineering, Waterloo, Canada

² Monash University, Electrical and Computer Systems Engineering, Melbourne, Australia

³ University of Waterloo, Systems Design Engineering, Waterloo, Canada

O 084 Clinical tool to measure shoulder joint kinematics in an objective and accurate manner using inertial measurement units

Alexandre Bagnoud¹, Arash Atrashi¹, Fabien Massé¹, Stéphane Armand², Kamiar Aminian³, Florent Moissener⁴

¹ MindMaze S.A, Digital Motion Analytics, Lausanne, Switzerland

² Hôpitaux Universitaires Genève HUG / Université Genève UNIGE, Kinesiology Laboratory, Geneva, Switzerland

³ Ecole Polytechnique Fédérale de Lausanne EPFL, Laboratory of Movement Analysis and Measurement LMAM, Lausanne, Switzerland

⁴ Hôpitaux Universitaires Genève HUG, Kinesiology Laboratory, Geneva, Switzerland

O 085 General movements automatic assessment: Methodological issues for pose estimation

Rita Stagni¹, Tommaso Doto¹, Arianna Tomadin¹, Alessandra Sansavini², Arianna Aceti³, Luigi Tommaso Corvaglia³, Maria Cristina Bisi¹

¹ University of Bologna, Department of Electric- Electronic and Information Engineering "Guglielmo Marconi" - DEI, Bologna, Italy

² University of Bologna, Department of Psychology "Renzo Canestrari" - PSI, Bologna, Italy

³ University of Bologna, Department of Medical and Surgical Sciences - DIMEC, Bologna, Italy

12) Upper extremity

Parallel Session:

14:15–15:30, Attica

Chairs: Catherine Huenaerts (Belgium), Tamaya Van Crielinge (Belgium)

O 086 Relationship between trunk muscle forces, static and dynamic postural malalignment in patients with adult spinal deformity

Maria Saade¹, Ali Rteil¹, Rami El Rachkidi¹, Celine Chaaya¹, Elma Ayoub¹, Elena Jaber¹, Elio Mekhael¹, Rami Rehayem¹, Abir Massaad¹, Ayman Assi¹

¹ Faculty of Medicine- University of Saint-Joseph, Laboratory of Biomechanics and Medical Imaging, Beirut, Lebanon

O 087 Investigation of the relationship between measurement of scapular asymmetry and working posture in dentists

Merve Keskin¹, Derya Ozer Kaya¹

¹ Izmir Katip Celebi University, Department of Physiotherapy and Rehabilitation, Izmir, Turkey

O 088 Kinematic limitations in trunk movements in adolescent idiopathic scoliosis

Karim Hoyek¹, Rony El Hayeck¹, Carlo El Khoury¹, Maria Karam¹, Maria Asmar¹, Maria Rassam¹, Pascal El Braidy¹, Mohamad Karam¹, Rami El Rachkidi¹, Ayman Assi¹

¹ Faculty of Medicine- University of Saint-Joseph, Laboratory of Biomechanics and Medical Imaging, Beirut, Lebanon

O 089 Quantifying morphological changes in middle trapezius with ultrasound scanning and a novel histogram matching algorithm

Fraser Philp¹, Erik Meilak², Tracey Willis^{2,3}, Naomi Winn⁴, Anand Pandyan⁵

¹ University of Liverpool, School of Health Sciences, Liverpool, United Kingdom

² Robert Jones and Agnes Hunt Orthopaedic Hospital, The Orthotic Research & Locomotor Assessment Unit, Oswestry, United Kingdom

³ University of Chester, Chester Medical School, Chester, United Kingdom

⁴ Robert Jones and Agnes Hunt Orthopaedic Hospital, Radiology, Oswestry, United Kingdom

⁵ Bournemouth University, Faculty of Health and Social Sciences, Bournemouth, United Kingdom

O 090 Application of 3D motion analysis to quantify a clinical test method assessing wrist spasticity

Anna Pennekamp¹, Mirjam Thielen², Julia Glaser³, Leila Harhaus³, Ursula Trinler¹

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² BG Trauma Center Ludwigshafen, Hand- Plastic- and Reconstructive Surgery- Laboratory for Clinical Movement Analysis, Ludwigshafen, Germany

³ BG Trauma Center Ludwigshafen, Hand- Plastic- and Reconstructive Surgery, Ludwigshafen, Germany

Coffee Break

15:30–16:00, Olympia Foyer

13) Imaging and anatomy

Parallel Session:

16:00–17:40, Olympia Hall

Chairs: Martin Šveblík (Austria), Nathalie De Beukelaer (Switzerland)

O 091 Reconstructing bones: using statistical shape modelling to create 3D models of the femur from ultrasound images

Alex Mitton^{1,2,3}, Jonathan Noble^{1,3}, Adam Shortland^{1,3}

¹ Guy's and St Thomas' Hospital Trust, One Small Step Gait Laboratory, London, United Kingdom

² King's College Hospital NHS Foundation Trust, Department of Medical Engineering and Physics, London, United Kingdom

³ King's College London, Division of Biomedical Engineering & Imaging Sciences, London, United Kingdom

O 092 Medial gastrocnemius muscle morphology in spastic cerebral palsy: A comparison between treatment naïve children and children with a treatment history

Fenna Walhain^{1,2}, Britta Hanssen³, Rhea Spong-Cruden³, Delaja Plein⁴, Chelsi Barden⁴,

Ruby Chin A Fat⁵, Marlies Declercq⁵, Lynn Bar-On⁶, Anja Van Campenhout^{2,7}, Kaat Desloovere^{2,8}

¹ Anton de Kom University of Suriname, Department of Anatomy, Paramaribo, Suriname

² KU Leuven, Department of Rehabilitation Sciences, Leuven, Belgium

³ Academic Hospital Paramaribo, Department of Neurology, Paramaribo, Suriname

⁴ Academic Hospital Paramaribo, Department of Pediatric Physical Therapy, Paramaribo, Suriname

⁵ Anton de Kom University of Suriname, Department of Physical Therapy, Paramaribo, Suriname

⁶ Ghent University, Department of Rehabilitation Sciences, Ghent, Belgium

⁷ University Hospital Leuven, Department of Orthopaedic Surgery, Leuven, Belgium

⁸ University Hospital Leuven, Clinical Motion Analysis Laboratory, Leuven, Belgium

O 093 Muscle quality: Intramuscular fat, collagen fibres, and mechanical properties in the triceps surae

Zhongzheng Wang¹, Francesco Cenni², Iida Laatikainen-Raussi², Taija Finni², Ruoli Wang¹

¹ KTH Royal Institute of Technology, KTH MoveAbility Lab- Department of Engineering Mechanics, Stockholm, Sweden

² University of Jyväskylä, Faculty of Sport and Health Sciences, Jyväskylä, Finland

O 094 A 3D ultrasound approach to assess muscle-tendon lengthening behavior in vivo during walking – a reliability study

Andreas Habersack^{1,2}, Christoph Leitner³, Sigrid Thaller², Markus Tilp², Martin Svehlik¹, Annika Kruse²

¹ Medical University of Graz, Department of Orthopaedics and Trauma, Graz, Austria

² University of Graz, Human Movement Science- Sport and Health, Graz, Austria

³ ETH Zurich, Integrated Systems Laboratory, Zurich, Switzerland

O 095 How do Achilles tendon properties correlate with gait performance in cerebral palsy?

Nathalie Alexander¹, Iida Laatikainen-Raussi², Afet Mustafaoğlu², Taija Finni², Francesco Cenni²

¹ Children's Hospital of Eastern Switzerland, Department of Paediatric Orthopaedics, St. Gallen, Switzerland

² University of Jyväskylä, Faculty of Sport and Health Sciences, Jyväskylä, Finland

O 096 Gastrocnemius medialis Muscle-tendon unit Properties do not differ between Children with unilateral and bilateral spastic Cerebral Palsy

Annika Kruse MA¹, Andreas Habersack^{1,2}, Bernhard Guggenberger^{2,3}, Markus Tilp¹, Martin Svehlik²

¹ University of Graz, Institute of Human Movement Science- Sport and Health, Graz, Austria

² Medical University of Graz, Department of Orthopaedics and Trauma, Graz, Austria

³ JOHANNNEUM University of Applied Sciences, Institute of Physiotherapy, Graz, Austria

O 097 In vivo assessment of tibialis anterior muscle in passive and active states using shear wave elastography

Cemre Su Kaya Keles¹, Jennifer Hiller¹, Manuela Zimmer¹, Filiz Ates¹

¹ University of Stuttgart, Institute of Structural Mechanics and Dynamics in Aerospace Engineering, Stuttgart, Germany

O 098 Medial gastrocnemius and achilles tendon interplay is not optimally exploited during gait in cerebral palsy

Francesco Cenni¹, Nathalie Alexander², Maria Sukanen¹, Zhongzheng Wang³, Ruoli Wang³,

Cecilia Lidbeck⁴, Harri Piitulainen¹, Taija Finni¹

¹ University of Jyväskylä, Faculty of Sport and Health Sciences, Jyväskylä, Finland

² Children's Hospital of Eastern Switzerland, Laboratory for Motion Analysis, St. Gallen, Switzerland

³ KTH Royal Institute of Technology- Stockholm, Department of Engineering Mechanics, Stockholm, Sweden

⁴ Karolinska Institutet, Department of Women's and Children's Health, Stockholm, Sweden

O 099 Acetabular orientation measured in the Lewinnek plane is not adequate for adult spinal deformity patients with high pelvic retroversion

Elena Jaber¹, Rami El Rachkidi¹, Elma Ayoub¹, Ali Rteil¹, Maria Saade¹, Celine Chaaya¹, Rami Rhayem¹, Ismat Ghanem¹, Abir Massaad¹, Ayman Assi¹

¹ Faculty of Medicine- University of Saint-Joseph, Laboratory of Biomechanics and Medical Imaging, Beirut, Lebanon

14) Prosthetics, Orthosis, assistive devices

Parallel Session:

16:00–17:40, Attica

Chairs: Adam Rozumalski (USA), Manousos Pentarakis (Greece)

O 100 Ankle power support of spring-like ankle foot orthoses and their effect on compensatory joint work

Niels Waterval¹, Frans Noller¹, Merel-Anne Brehm¹

¹ Amsterdam UMC, Rehabilitation Medicine, Amsterdam, Netherlands

O 101 Effect of shoes as a walking aid on pathological gait in children and adults

Lisa Khavvam¹, Wilfried Alt¹, Richard Doepner², Sonia D'Souza PhD²

¹ University of Stuttgart, Department of Sport and Exercise Science, Stuttgart, Germany

² Olgahospital- Klinikum Stuttgart, Gaitlab- Orthopedics, Stuttgart, Germany

O 102 ADJUST: A stiffness adjustable ankle-foot-orthosis for rapid human-in-the-loop orthosis selection

Rein Miedema^{1,2}, Niels Waterval¹, Cor Meijneke², Jaap Harlaar², Frans Noller¹, Merel Brehm¹

¹ Amsterdam UMC, Rehabilitation Medicine, Amsterdam, Netherlands

² Delft University of Technology, Biomechanical Engineering, Delft, Netherlands

O 103 Increased of stability and security in transfemoral amputees with a knee-ankle synergistic system

Christelle Requena¹, Joseph Bascou¹, Xavier Bonnet², Clement Duraffourg³, Isabelle Loiret⁴, Marie Thomas-Pohl⁵, Cyril Logel¹, Benjamin Callens⁴, Nathalie Rapin⁴, Hélène Pillot²

¹ Centre d'Etudes et de Recherche sur l'Appareillage des Handicapés, Institution Nationale des Invalides, Créteil, France

² Institut de Biomécanique Humaine Georges Charpak IBHGC, Arts et Metiers Institute of Technology, Paris, France

³ Proteor, Recherche et Développement, Saint Apollinaire, France

⁴ Institut Régional de Médecine Physique et de Réadaptation de Nancy, UGECAM du Nord-Est, Nancy, France

⁵ Service de Médecine Physique et de Réadaptation, Hôpital d'Instruction des Armées Percy, Clamart, France

O 104 Sit-to-stand performance with and without ankle joint-restricted orthoses in adults with myelomeningocele

Marie Eriksson¹, Josefine Eriksson Naili¹, Morten Bilde Simonsen^{2,3}, Åsa Bartonek¹

¹ Karolinska Institutet, Women's and Children's Health, Stockholm, Sweden

² Aalborg University, Materials and Production, Aalborg, Denmark

³ Aalborg University, Center for Mathematical Modelling of Knee Osteoarthritis, Aalborg, Denmark

O 105 Measuring transtibial prosthetic socket-to-residuum interface coupling in gait using 3D motion capture

Michael Baldock¹, Niamb Gill¹, David Howard¹, Samantha Curtin¹

¹ University of Salford, Health and Society, Salford, United Kingdom

O 106 Investigating gait variability in amputees with phantom sensation

Halit Selçuk¹, Nimet Sermenli Aydın², İlke Kurt³, Sezer Ulukaya⁴, Sinem Salar⁵, Hilal Keklice¹

¹ Trakya University, Department of Physiotherapy And Rehabilitation, Edirne, Turkey

² Marmara University, Department of Physiotherapy and Rehabilitation, Istanbul, Turkey

³ Trakya University, Department of Computational Sciences, Edirne, Turkey

⁴ Trakya University, Department of Electrical and Electronics Engineering, Edirne, Turkey

⁵ Trakya University, Department of Occupational Therapy, Edirne, Turkey

O 107 Phenotyping patients undergoing total knee arthroplasty with full body clinical gait analysis

Xavier Gasparutto¹, Alice Bonnefoy-Mazure¹, Michael Attias², Katia Turcot³, Hermès Miozzari⁴, Stéphane Armand¹

¹ Geneva University Hospitals and University of Geneva, Laboratory of Kinesiology Willy Taillard, Geneva, Switzerland

² University of Applied Sciences and Arts Western Switzerland, School of Health Sciences, Geneva, Switzerland

³ Laval University, Faculty of Medicine- Department of Kinesiology, Quebec, Canada

⁴ Geneva University Hospitals and University of Geneva, Division of Orthopaedic Surgery and Musculoskeletal Trauma Care- Surgery Department, Geneva, Switzerland

O 108 Effects of walking with hinged ankle-foot-orthosis on propulsion and body weight support in unilateral cerebral palsy

Katrin Bracht-Schweizer¹, Jacqueline Romkes¹, Bastian Widmer², Elke Viehweger¹, Morgan Sangeux¹

¹ University Children's Hospital Basel UKBB, Neuro-Orthopedic Departement/Laboratory for Movement Analysis, Basel, Switzerland

² Universität Basel, Department Mathematics and Computer Science, Basel, Switzerland

ESMAC Gala Dinner

22. 9. 2023, 19:30–00:00, Moorings restaurant

Saturday 23 September

15) Movement analysis methodology III

Plenary Session:

08:30–10:35, Olympia Hall

Chairs: Francesco Cenni (Finland), Gabor Barton (United Kingdom)

O 109 A new functional classification in adult spinal deformity patients based on 3D gait analysis

Rami Rehayem¹, Elio Mekhael¹, Rami El Rachkidi¹, Nabil Nassim¹, Wafa Skalli², Ismat Ghanem¹, Abir Massaad¹, Renaud Lafage³, Virginie Lafage³, Ayman Assi^{1,2}

¹ Faculty of Medicine- University of Saint-Joseph, Laboratory of Biomechanics and Medical Imaging, Beirut, Lebanon

² Arts et Métiers, Institut de Biomecanique Humaine Georges Charpak, Paris, France

³ Lenox Hill Hospital, Spine surgery, New York, USA

O 110 Utilizing ADPlot pathology maps for HSP, CP, Diplegia, MS, and Stroke: An additional layer of evaluation in clinical gait analysis

Nicolaos Darras¹, Corey Joseph¹, Anna Murphy¹

¹ Monash Health, Clinical Gait Analysis Service, Melbourne, Australia

O 111 Hip rotation obtained via conventional and functional knee joint axis calibration in the context of femoral derotation osteotomy

Arik Rehani Musagava¹, Marco Götze¹, Sebastian I. Wolf¹

¹ Clinic for Orthopaedics, Heidelberg University Hospital, Heidelberg, Germany

O 112 A functional method for estimating the hip joint center of rotation in children with cerebral palsy

Emiliano Pablo Ravera^{1,2}, Adam Rozumalski³

¹ CONICET - National University of Entre Ríos, Group of Analysis- Modeling- Processing and Clinician Implementation of Biomechanical Signals and Systems- Bioengineering and Bioinformatics Institute, Oro Verde, Argentina

² National University of Entre Ríos, Human Movement Research Laboratory- School of Engineering, Oro Verde, Argentina

³ Gillette Children's Specialty Healthcare, James R. Gage Center for Gait and Motion Analysis, St. Paul- MN, USA

O 113 A Delphi Process is being applied to objectify the systematic use of EMG in therapy of Cerebral Palsy

Robert Reisig¹, Mehrdad Davoudi¹, Marco Götze¹, Firooz Salami¹, Sebastian Wolf¹

¹ Orthopädische Universitätsklinik Heidelberg, Heidelberg Motionlab, Heidelberg, Germany

O 114 Modeling the foot-ground interaction during walking using foot rockers and functional calibration algorithms

Fiروز Salami¹, Sarah Campos¹, Marco Goetze¹, Sebastian I. Wolf¹

¹ Universitätsklinikum Heidelberg, Orthopedics and Trauma Surgery, Heidelberg, Germany

O 115 Is it time to re-think the appropriateness of autocorrelation for gait event detection? Preliminary results of an ongoing study

Bernhard Dumphart¹, Djordje Slijepcevic², Andreas Kranz³, Matthias Zeppelzauer², Brian Horsak¹

¹ St. Pölten University of Applied Sciences, Center for Digital Health & Social Innovation, St. Pölten, Austria

² St. Pölten University of Applied Sciences, Institute of Creative\Media\Technologies, St. Pölten, Austria

³ Orthopaedic Hospital Vienna-Speising, Laboratory of Gait and Movement Analysis, Vienna, Austria

O 116 The importance of the functional base-of-support for clinical biomechanical balance analysis

Lizeth Sloot¹, Elza van Duijnhoven², Merel A. Brehm², Tamaya Van Crielinge³, Matthew Millard⁴

¹ Heidelberg University, Institute of Computer Engineering ZITI, Heidelberg, Germany

² Amsterdam UMC, Department of Rehabilitation, Amsterdam, Netherlands

³ KU Leuven, Department of Rehabilitation Sciences and Physiotherapy, Brugge, Belgium

⁴ University of Stuttgart, Institute for Sport and Movement Science and Institute of Engineering and Computational Mechanics, Stuttgart, Germany

O 117 Kinetic errors in 3D gait analysis driven by inaccurate inertial parameter estimation of prosthetic limbs

Timothy Arthur¹, Fabien Leboeuf, Caroline Stewart¹

¹ Robert Jones & Agnes Hunt Orthopaedic Hospital NHS Foundation Trust, Orthotic Research & Locomotor Assessment Unit, Oswestry, United Kingdom

² Centre Hospitalier Universitaire de Nantes, Laboratoire d'Analyse du Mouvement, Nantes, France

O 118 Evaluating the use of electromyography in UK and european gait laboratories for the assessment of cerebral palsy and neurological conditions

Hannah Shepherd¹, Jo Reeves², Caroline Stewart^{3,4}

¹ Liverpool Hope University, School of Health and Sport Sciences, Liverpool, United Kingdom

² University of Exeter, Sport and Health Sciences, Exeter, United Kingdom

³ The Robert Jones and Agnes Hunt Orthopaedic Hospital, The Orthotic Research & Locomotor Assessment Unit, Oswestry, United Kingdom

⁴ Keele University, School of Pharmacy and Bioengineering, Keele, United Kingdom

O 119 Patellofemoral tracking using a grid of skin-mounted markers evaluated by four-dimensional computed tomography

Jaap Harlaar¹, Erin Macri¹, Mariska Wesseling¹

¹ TUDelft, Biomechanical Engineering, Delft, Netherlands

Coffee Break

10:35–11:05, Olympia Foyer

16) Adult neurology

Plenary Session:

11:05–12:10, Olympia Hall

Chairs: Ursula Trinler (Germany), Tom Buurke (Netherlands)

O 120 Exploring gait kinematic variability in patients with severe vestibulopathy

Gautier Grouvel^{1,2}, Anissa Boutabla¹, Stéphane Armand², Julie Corre¹, Rebecca Revol¹, Samuel Cavuscens¹, Maurizio Ranieri¹, Raymond van de Berg³, Nils Guinand¹, Angelica Perez-Fornos¹

¹ University of Geneva and Geneva University Hospitals, Division of Otorhinolaryngology Head and Neck Surgery, Geneva, Switzerland

² University of Geneva and Geneva University Hospitals, Kinesiology Laboratory, Geneva, Switzerland

³ Maastricht University Medical Center, Division of Balance Disorders - Department of Otorhinolaryngology and Head and Neck Surgery, Maastricht, Netherlands

O 121 Instrumented selective control assessment of the lower extremity to identify neural constraints in muscle co-activation during treadmill walking after stroke

Tom Buurke^{1,2}, Míriam Febrer-Nafria³, Geert Verbeyden⁴, Friedl De Groot²

¹ University of Groningen- University Medical Center Groningen, Department of Human Movement Sciences, Groningen, Netherlands

² KU Leuven, Department of Movement Sciences, Leuven, Belgium

³ Universitat Politècnica de Catalunya, Department of Mechanical Engineering, Barcelona, Spain

⁴ KU Leuven, Department of Rehabilitation Sciences, Leuven, Belgium

O 122 Reliability and validity of a new observation scale to evaluate the upper limb during gait in persons after stroke

Arne Defour¹, Daan De Vlioger¹, Robbe De Baets¹, Kristine Oostra², Dirk Cambier¹, Hanne Maebe³, Koen Matthys⁴, Pieter Meyns⁵, Anke Van Bladel¹

¹ Ghent University, Rehabilitation sciences, Ghent, Belgium

² Ghent University Hospital, Physical Medicine and Rehabilitation, Ghent, Belgium

³ BZIO, Physical and Rehabilitation Medicine, Ostend, Belgium

⁴ Maria Middelaers Hospital Ghent, Physical Medicine and Rehabilitation, Ghent, Belgium

⁵ Hasselt University, Rehabilitation Research REVAL, Diepenbeek, Belgium

O 123 Quantifying motor fatigability during prolonged walking in people with multiple sclerosis

Nienke Heida¹, Sjoerd Timmermans¹, Koen Wishaupt¹, Heleen Beckerman¹, Vincent de Groot¹, Marjolein van der Krogt¹

¹ Amsterdam UMC location Vrije Universiteit Amsterdam, Rehabilitation Medicine, Amsterdam, Netherlands

O 124 Comparison of two video-based metrics for assessing hypomimia in Parkinson's disease

Elena Pegolo¹, Gloria Boldrini¹, Lucia Ricciardi², Zimi Sawacha¹

¹ University of Padova, Department of Information Engineering, Padova, Italy

² St. George's University of London, Neuroscience, London, United Kingdom

O 125 The effect of morphometric brain changes on gait-cognitive impairment of patients with Parkinson's disease

Christiane Malá¹, Slavka Netukova¹, Tereza Duspivova¹, Petr Dušek², Ondrej Bezdicek², Anna Vazna³, Evzen Ruzicka², Radim Krupicka¹

¹ Czech Technical University in Prague, Faculty of Biomedical Engineering, Prague, Czech Republic

² Charles University, 1st Faculty of Medicine and General University Hospital in Prague - Dept. of Neurology and Center of Clinical Neuroscience, Prague, Czech Republic

³ Charles University, Faculty of Science - Dept. of Anthropology and Human Genetics, Prague, Czech Republic

Keynote Lecture 3

12:15–13:00, Olympia Hall

Clinical Research in Cerebral Palsy and the Role of Gait Analysis

Tim Theologis (United Kingdom)

Chair: Nikos Rigopoulos (Greece)

Award & Closing Ceremony

23. 9. 2023, 13:00–13:30, Olympia Hall

Chairs: Ayman Assi (Lebanon), Georgios Gkrimas (Greece)

List of Posters

Pediatric neurology

P 001 Serious game with electromyography feedback in children with unilateral spastic cerebral palsy and equinus gait: a prospective open-label study

Christophe Boulay¹, Jean-Michel Gracies², Lauren Garcia¹, Guillaume Authier¹, Maud Pradines², Taian Veiera³, Talita Pinto⁴, Marco Gazzoni³, Bernard Parratte¹, Sébastien Pesenti¹

¹ Aix Marseille University, Gait lab- pediatric orthopaedic surgery department- Timone Children Hospital, Marseille, France

² UR 7377 BIOTN- Laboratoire Analyse et Restauration du Mouvement- Université Paris Est Créteil UPEC- France, AP-HP- Service de Rééducation Neurolocomotrice- Unité de Neuroéducation- Hôpitaux Universitaires Henri Mondor- Créteil F-94010 France, Créteil, France

³ Laboratory for Engineering of the Neuromuscular System LISiN- Department of Electronics and Telecommunication- Politecnico di Torino- Turin- Italy, PoliToBIOMed Laboratory- Department of Electronics and Telecommunications- Politecnico di Torino- Corso Duca degli Abruzzi 24- 10129- Turin- Italy, Turin, Italy

⁴ Laboratory for Engineering of the Neuromuscular System LISiN- Department of Electronics and Telecommunication- Politecnico di Torino- Turin- Italy, Instituto D'Or de Pesquisa e Ensino IDOR- Rio de Janeiro- Brazil, Turin, Italy

P 002 The evaluation of factors affecting the unassisted walking distance in crouch gait with using three-dimensional gait analysis

Meltem Celik¹, Ozan Ali Erdal², Osman Doğan¹, Barış Görgün², İlker Abdullah Sarıkaya², Muharrem İnan²

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P 003 The effects of split tibialis anterior tendon transfer to peroneal tendon for equinovarus foot in children with unilateral cerebral palsy

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P 004 Knee joint contact forces to assess the effect of single event multi level surgery over time in crouch gait

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P 005 Biomechanical evaluation of sitting postural control in infants: A systematic review

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P 006 Smart technology intervention to retrain gait in children with idiopathic toe walking

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P 007 Relationship between hamstring lengths calculations during gait and mobility in children with spastic cerebral palsy

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P 008 The effects of different types of gait training on gait performance in children and young adults with cerebral palsy

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P 009 Medial gastrocnemius morphology after orthopedic surgery in a child with spastic cerebral palsy

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P 010 Assessment of postural control with deprivation of visual system and somatosensorial perturbation in child with autism: case report

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P 011 tDCS over the temporal cortex to improve the functional capacity of children with cerebral palsy: Randomized, placebo-controlled, double-blind crossover pilot study

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P 012 How does artificially reduced rectus femoris primed knee extensor muscle force alters the gait biomechanics in children with cerebral palsy?

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P 013 Can we predict lower extremity motor control problems from single leg standing test for children with cerebral palsy?

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P 014 Investigation of the relationship between lower extremity selective motor control and single-leg standing biomechanics in children with spastic cerebral palsy

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P 015 Selective motor control may be associated with the single support time of gait and single limb standing time in cerebral palsy

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P 016 Relationship between spastic catch measurements and ankle joint movement in walking and hopping in children with cerebral palsy

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P 017 IMU-based protocol for gait performance assessment in paediatric patients with rare neurological diseases

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P 018 Gait deviations in rare genetic syndromes: is there a common denominator for patients with Dravet, HVDAS and TSC?

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P 019 Can children with mild Cerebral Palsy be detected by the recently implemented early detection protocol in Suriname: A case study

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P 020 Are there differences in energy expenditure during routine ambulation of children with hereditary spastic paraparesis and diplegic spastic cerebral palsy?

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Normative studies

P 021 The manifestation of leg-preference in 7-year-old children: The role of task characteristics

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P 022 Preliminary data of kinematics and kinetics of forward lunge in exercise-proficient individuals: Does dominant vs. non-dominant leg matter?

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P 023 ECG noise removal using wavelet transform during the gait

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P 024 Preliminary data of a 3D single-limb-squat assessment of laterality in exercise-proficient physiotherapists

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Movement analysis methodology

P 025 ☆ The effects of tight or loose-fitting clothing on markerless gait kinematics in adults

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P 026 ☆ Can a walking intervention using an activity monitor improve individuals' daily activity and function post THR surgery: A randomised pilot trial

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P 027 Practical inertial sensing-based method for estimating 3d joint kinematics in the Vicon Clinical Manager anatomical frame definition

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P 028 There is life outside the gait lab: Effectiveness of a self-organising neural map for recognising 24/7 activities of daily living

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P 029 Feasibility of a kinematics-based protocol for monitoring a patient with hemiplegia while performing indoor rowing

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P 030 Effectiveness of tele-rehabilitation in the recovery of motor abilities in post-Covid Patients: Preliminary Results

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P 031 Clinical Gait Analysis Manager: Freeware application to store, process and present Gait Analysis data

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P 032 IMU-based ground reaction force estimation using OpenSim Moco

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P 033 Biomechanical constraints on escape from threat in virtual reality: Preliminary findings

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P 034 Reliability and validity of integrated treadmill H/P cosmos pluto med for gait parameters

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P 035 Age group identification using machine learning and IMU: A comparison of sensor placements

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P 036 Antigravity muscle efforts during walking determined using an inverse dynamics approach

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P 037 Comparison of spatio-temporal parameters between total gait and steady gait

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P 038 A comparative study on wearables and single-camera video for upper-limb out-of-the-lab activity recognition with different deep learning architectures

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P 039 Explainable machine learning approach on biomechanical features to identify weakness in a population-based setting on aging

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P 040 The effects of accelerometer sensor position on freezing gait ratio parameters

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P 041 Reliability of 3D kinematic recording of jaw and head movements

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P 042 Comparison of the degree of reliability in forensic gait analysis methods

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P 043 Linearity assessment between lower limb joint angles and angular accelerations at standard maximum vertical jumps with long-short and no countermovement

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P 044 The predictive and functional calibration method in 3D gait analysis using Human Body Model-II produce different 3D joint angles

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P 045 Movement tracking and action classification for human behaviour under threat in virtual reality

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P 046 Gait speed estimation via inertial sensors and machine learning

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Adult neurology and elderly

P 047 **Effect of functional fatigue on Peak torque and Rate of force development during unanticipated single-leg landing in athletes with CLBP**

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P 048 **To combine or not physical therapy with tDCS for stroke with shoulder pain? Analysis for rehabilitation of painful shoulder stroke**

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P 049 **Additive effect of tDCS in combination with multicomponent training on elderly physical function capacity: a randomized, triple-blind, controlled trial**

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P 050 ☆ **Impaired spatiotemporal gait parameters in patients with unilateral and bilateral vestibular deficits**

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P 051 ☆ **A comparison of the directionality of head tremor between essential and dystonic tremor**

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P 052 Are quantitative measures of the Romberg test correlated to lower limb pathology in patients with degenerative cervical myelopathy?

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P 053 Examining the gait pattern in terms of spatio-temporal, kinematic and kinetic parameters during gait initiation in MS patients

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P 054 ☆ Muscle strength and equilibrium-maintaining ability in post-COVID women

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P 055 Cost of walking in adults with Cerebral palsy (COWAC) – a study protocol and case presentation

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P 056 The effects of cognitive impairment on gait in Parkinson's disease

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P 057 Do gait stability and arm swing affect walking speed during the 6-minute walk test in persons with Multiple Sclerosis?

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P 058 ☆ Backward and forward walking and its association with falls and fear of falling in people with multiple sclerosis

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P 059 Sleep analysis via wearable sensors in people with Parkinson's disease

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P 060 A Delphi study to identify key gait patterns and their underlying causes in patients with Multiple Sclerosis

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Imaging and anatomy

P 061 Evaluation of the gastrocnemius muscle-tendon length reserve during gait in children with idiopathic toe walking

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P 062 Measuring skeletal muscle morphology in children with cerebral palsy – A scoping review update of the last 4 years

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P 063 In vitro evaluation of a method to locate bony structures using freehand 3DUS

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P 064 Test-retest reliability of 3D ultrasound to visualize the gross structures of the medial gastrocnemius

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P 065 The volume of the lateral gastrocnemius appears reduced in some Idiopathic toe walkers

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Sports

P 066 How can saddle height changes the risk injuries of lumbar during the cycling: Kinematics and musculoskeletal modeling approach

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P 067 How execution of tennis forehand overhead smash changes the shoulder complex kinematics: musculoskeletal modeling

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P 068 Neuromuscular characters influenced by knee flexion-extension during martial art techniques: Axial kick VS front kick

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P 088 The interaction between biomechanical variables and ventilatory thresholds during running

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P 089 Effects of transcranial direct current stimulation on muscle fatigue in recreational runners randomized, sham-controlled, triple-blind, crossover study

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P 090 Does roller-skating sport improve motor abilities in pediatric population?

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P 132 Usage of the tissue flossing and occlusion bands during warm-up have negative impact on muscle strength

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P 133 Investigation of the knee angular velocity proprioceptive behavior as the joint velocity increases

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P 149 The impact of quadriceps' fatigue on the proprioceptive perception of the knee joint position sense

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P 150 Hip abductor endurance affects more dynamic knee valgus than hip abductor strength

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P 151 Association between the occurrence of falls and winning and losing in the final tournament of wheelchair basketball at Paralympic games

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P 152 Effect of stance width on lower extremities joint kinematics during a squat jump by musculoskeletal modeling in OpenSim software

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P 153 Evaluation of knee joint reaction force for the back and front leg during the forward jump in soccer

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P 154 Muscle coactivation analysis for neuromuscular control assessment of lower limb stretch-shortening cycle

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P 155 Comparison of the proprioceptive abilities of joint position sense and angular velocity sense, at the knee joint

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Prosthetics, orthotics and assistive devices

Konstantinos Tsoukalas¹, Ioannis Maliouis¹, Anthi A.Kellari¹, Zacharias Dimitriadis¹, Eleni Kapreli¹, Nikolaos Strimpakos¹, Ioannis Poulis¹, Asimakis K.Kanellopoulos¹

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P 069 Impact of foot orthosis design on gait in children with Charcot-Marie-Tooth

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P 070 Orthotic effects of functional electrical stimulation (FES) on gait and dual-task ability in adult patients with upper motor neuron disease

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P 071 ☆ Is it necessary to assess shod walking before testing orthoses on pathological gait in children and adults?

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P 072 Dynamic socket interface mechanics for a transfemoral amputee during walking

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P 073 Physical function and activity in adults with myelomeningocele after orthotic management from childhood: a descriptive study

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P 074 Time-continuous motion analysis of overground walking at varying levels of robot-assisted modulated body weight unloading

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P 075 Effect of different knee prostheses on functional mobility assessed using an inertial sensor

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P 076 The impact of robot assisted modulated body weight support on overground gait kinematics in young adults with neurological disorders

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P 077 The effect of perturbation on hip kinematics of transtibial amputees

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P 078 Effect of feeling the phantom sensation during gait on spatiotemporal gait characteristics in individuals with transtibial amputation

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Balance

P 079 Lower limb kinematics, coordination and muscular activity responses to mobile phone use during gait

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P 080 Investigation of the effect of auditory noise on gait stability in healthy young and elderly individuals

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P 081 Gait-related dynamic stability and standing balance in ambulatory children with spastic Cerebral Palsy - Should we task-specifically test and train?

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P 082 Comparing the effects of multi-session cerebellar and prefrontal trans-cranial direct current stimulation on postural balance in patients with multiple sclerosis

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P 083 Comparing perturbation rejection of karate experts and novices in shiko-dachi stance

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P 084 Assessment and comparison of postural control between children and adults with visual impairment: A preliminary study

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P 085 A dual-task study of balance and cognitive prioritization in healthy young adults – preliminary results

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P 086 Comparison of gait symmetry in individuals with and without Covid-19 history

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P 087 “I’d go slow and hope I don’t fall” Exploring lived experiences of children with cerebral palsy walking in challenging environments

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Musculoskeletal disorders

P 091 Effects of digital-based physical activity intervention on pain, function and adherence in individuals with knee osteoarthritis: a pilot randomized-controlled trial

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P 092 Posture analysis and dynamic balance in adolescents with idiopathic scoliosis

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P 093 Association between forward head posture, sternocleidomastoid muscle thickness, and body composition in individuals with forward head posture

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P 094 Effects of instrument-assisted soft tissue mobilization and myofascial release techniques in individuals with chronic neck pain: A Pilot Study

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P 095 Do women with patellofemoral pain syndrome have weaker hip abductor strength compared to asymptomatic individuals?

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P 096 Comparison of spine structure, mobility, and competency in dentists with and without low back pain

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P 097 Association of trunk muscle endurance with disability and standing balance in women with chronic non-specific neck pain

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P 098 Patients with scoliosis have dysfunctional spinal muscles, preliminary study

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P 099 Phase coordination index of patients with chronic low back and chronic neck pain

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P 100 Effects of plantar flexors muscle weakness on gait biomechanics in an idiopathic toe walker child: a case study

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P101 Relationship between single leg squat kinematics and knee joint position sense, lower extremity strength: Pilot study

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P102 Individuals with pre-obesity exhibit a more asymmetrical gait pattern

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P103 Is there a universal physiological mechanism for limiting the load on the damaged knee joint?

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P104 Comparison of isokinetic parameters of the operated side versus non-operated side shoulder joint in breast cancer survivors

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P105 ☆ Movement patterns are different but muscle activations are unchanged in women with patellofemoral pain

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P106 The alignment of the trunk and pelvis during walking in achondroplasia and factors increasing anterior pelvic tilt

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P156 **Effects of posterior spinal fusion surgery on spatiotemporal, kinematics, kinetics, and electromyography of patients with severe Adolescent Idiopathic Scoliosis**

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Modelling and simulation

P107 **Analyzing the Impacts of Rectus Femoris Transferring and Botulinum Toxin on Cerebral Palsy: a Case study**

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P108 **Simulation of isometric muscle contraction in children with cerebral palsy**

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P109 **Modeling of different arm swing and the effect on hip flexors and extensors**

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P110 **Muscle activity of upper extremity during the is tennis forehand overhead smash: Experimental VS musculoskeletal modeling**

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P111 **Design of cushioned footwear for children with obesity based on gait dynamics and motion simulation**

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Upper extremity

P112 Pressure measurements in the shoulder region of police officers wearing equipment vests

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P113 ☆ Exploring the potential of combining kinematics and EMG to enhance identification of individuals with subacromial shoulder pain

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P114 Modulation of trunk symmetry using sensory stimulation in post-stroke patients: The study design

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P115 The relation between bimanual coordination, lesion timing, and corticospinal tract wiring pattern in children with unilateral cerebral palsy

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P116 Investigating gait behavior in children with scoliosis diagnosed Juvenile Idiopathic Arthritis: Pilot Study

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P 117 Impact of static postures on scaling accuracy of shoulder complex: Motion analysis and simulation study

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P 118 Identification of movement and muscle activity patterns in young people with and without shoulder instability

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P 119 The effect of different postural conditions on velocity of the sternum during deep breathing in individuals with mild-to-moderate Covid-19 history

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P 120 Biomechanical evaluation of the upper extremity in patients with osteogenesis imperfecta – a pilot study

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P 121 Poor functional task performance and compensatory trunk movements remain two years after total knee arthroplasty

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P 122 **A novel method for tracking movements of backpack's centre of mass in dynamic activities**

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Coordination and motor control

P 123 **The effect of bilateral heel raisers on knee biomechanics in standing and walking activities in hypermobile and typically developed participants**

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P 124 **Investigating the effects of heel-only and entire sole lift on lower extremity kinematics during walking in healthy individuals**

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P 125 **The effect of increased posterior pelvic tilt on gait kinematics in healthy individuals**

Elif Erdal¹, Fatma Beyza Üstündağ¹, Halil İbrahim Hasgöl¹, Nazif Ekin Akalan Ph.D PT^{1,2}, Shavkat Kuchimov^{2,3}, Kübra Önerge¹, Halenur Evrendilek¹

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P 126 **Effect of osteopathic visceral manipulation for individuals with functional constipation and chronic nonspecific low back pain: randomized controlled trial**

Walkyria Vilas Boas Fernandes¹, Fernanda Ishida Correa¹, Cid Andre Fidelis de Paula Gomes¹, Cleofas Rodriguez Blanco², Paulo Roberto Garcia Lucareli¹, Fabiano Politti¹, Joao Carlos Ferrari Correa¹

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- P 127** **A new exercise protocol for improving diagnostics of short hamstring muscle-tendon length in patients with a central neurological lesion**
- Mahdieh Hajibozorgi¹, Ilse Leijen^{1,2}, Manouk Duijndam², Juha M. Hijmans¹, Greve Christian^{1,2}*
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- ² University of Groningen- University Medical Center Groningen, Department of Human Movement Sciences, Groningen, Netherlands
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- P 128** **Knee flexion while walking versus knee contractures in children with bilateral spastic cerebral palsy**
- Cecilia Lidbeck¹, Bartonek Åsa¹*
- ¹ Karolinska Institutet, Women's and Children's Health, Stockholm, Sweden
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- P 129** **The effect of bilateral heel wedge on lower extremity kinematics during walking for children with hypermobility**
- Buse Ayan¹, Irem Opan¹, Nazif Ekin Akalan^{2,3}, Kubra Onerge^{3,4,5}, Shavkat Kuchimov^{6,7}*
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- P 130** **The relationship of knee flexor and extensor muscle strength and tightness with squat performance in children with cerebral palsy**
- Elif Cankatar¹, Kubra Onerge^{1,2,3}, Tuana Gerede¹, Bilge Nur Ozturk¹, Rukiye Sert⁴, Nazif Ekin Akalan^{1,3}, Shavkat Kuchimov^{3,5}, Halenur Evrendilek^{1,3}, Fuat Bilgili⁶*
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P 131 Trochanteric prominence angle test (TPAT)! What is it good for?

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Foot and ankle

P 134 How saddle height changes the hip kinematics pattern in different degree of freedom

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P 136 Comparison of the effects of low-dye and kinesiio taping in plantar fasciitis

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P 137 Foot symptoms and associated proximal joint dysfunctions in paediatric flatfeet

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P 138 Which strategy is dominant in functional ankle instability individuals during gait walking?

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P 139 Effects of exercises and insoles on foot posture, plantar force distribution, and balance in individuals with flexible flatfoot

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P 140 Comparison of foot function, physical performance, and quality of life between women with and without symptomatic bilateral hallux valgus deformity

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P 141 Plantar pressure reduction through self-adapting insoles with a heel-cup in standard and rocker shoes

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P 142 The effect of minimalist footwear wearing on biomechanical parameters of gait

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P 143 Acute muscle swelling and muscle hypertrophy are associated with resistance training to the peroneus muscles

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P 144 What are the effects of induced toe flexor weakness on foot kinematics? A study protocol and preliminary results

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P 145 **Gender differences in distance between the talus and lateral malleolus during gait using ultrasound in healthy adults**
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P 146 **Effects of 8-weeks selective training on the peroneus longus and peroneus brevis morphologies**
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P 147 **An approach to establishing the thresholds of plantar loading in obese children**
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P 148 **Design and validation of 3D printed orthotic insoles for children with flatfoot**
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