

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 OLYMPIA		15) Movement analysis methodology III OLYMPIA
8:35			
8:50	Baumann Lecture - Prof Sebastian Wolf (past president of ESMAC)	9) Foot and ankle (starts 8:35) OLYMPIA	
9:20	1) Modelling and simulation I OLYMPIA		
10:25	Sponsors' Pitches - 10 mins	MovesHelf Presentation	
10:30			
10:35	Coffee Break (10:35)	Coffee Break (10:30)	Coffee Break (10:35)
11:00	2) Pediatric neurology OLYMPIA	10) Markerless motion analysis OLYMPIA	16) Adult neurology OLYMPIA
12:15		Contemplas + Movella Industry Presentation	
12:25	Keynote Lecture 1 George Georgoulis OLYMPIA	Keynote Lecture 2 Łukasz Kidziński OLYMPIA	Keynote Lecture 3 Tim Theologis OLYMPIA
13:00-13:30	Vicon Industry Workshop OLYMPIA		Award & Closing Ceremony OLYMPIA
13:10	Lunch & Posters I. KALIRROE	Lunch & Posters II. KALIRROE	
14:15	3) Modelling and simulation II OLYMPIA	4) Stability, proprioception & motor control ATTICA	5) Musculoskeletal disorders Templares TEMPLARES
		11) Movement analysis methodology II OLYMPIA	12) Upper extremity ATTICA
15:30	Coffee Break		Coffee Break
16:00	6) Sports OLYMPIA	7) Movement analysis methodology I ATTICA	8) Pediatrics and neuro-pediatrics TEMPLARES
		13) Imaging and anatomy OLYMPIA	14) Prosthetics, Orthosis, assitive devices ATTICA
17:40	ESMAC Annual General Assembly OLYMPIA		
18:40	Motek User Group Meeting (18:40-20:00) ATTICA		
19:30		ESMAC Gala Dinner (19:30-00:00)	

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)

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 Campenbout², 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

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

Mehrdad Davoudi¹, Firooz Salami¹, Robert Reising¹, 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 Vandekerckhove¹, Dhruv Gupta², Lars D'Hondt³, Marleen Van den Hauwe^{1,3},

Anja Van Campenhou^{4,5}, Liesbeth De Waele^{3,4}, Nathalie Goemans^{3,4}, Kaat Desloovere^{1,6},

Friedl De Groot²

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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

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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, Bjorn Keller Englund², Mathias Kristiansen³, Michael Skipper Andersen⁴

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

² Anybody Technology, a/s, Aalborg, Denmark

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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}

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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 Campenbout², Kaat Desloovere⁴

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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}, Tjil Dewit^{1,3}, Marleen Van den Hauwe^{1,4}, Anja Van Campenbout^{5,6}, Liesbeth De Waele^{4,5}, Friedl De Groot⁷, Kaat Desloovere^{1,3}

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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 Groot (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, Mohamad Karam², Helene Pillet¹, Ayman Assi^{1,2}

¹ Arts et Métiers, Institut de Biomecanique 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^{4,5}, Colin Smith⁶, Martin Svelblik¹, Hans Kainz²

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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

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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}

¹ *University of Montreal, Institute of Biomedical Engineering- Faculty of Medicine, Montreal, Canada*

² *The Sainte-Justine University Hospital CRCHUSJ, Research Center of the Sainte-Justine University Hospital CRCHUSJ, Montreal, Canada*

³ *University of Montreal, School of Kinesiology and Physical activity Sciences, Montreal, Canada*

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 Föll^{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 Nadir^{3,5}, Halenur Evrendilek^{1,3}, Fuat Bilgili⁶

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² Hacettepe University, Graduate School of Health Sciences- Physical Therapy and Rehabilitation Division, Ankara, Turkey

³ Istanbul Kultur University, Motion Analysis Center, Istanbul, Turkey

⁴ Istanbul University, Institute of Health Sciences- Department of Pediatric Basic Sciences- Developmental Neurology, Istanbul, Turkey

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 Mekbael¹, Nabil Nassim¹, Abir Massaad¹, Ayman Assi¹

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

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

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

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 Polli³, 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

¹ Maastricht University Medical Center+, Department of Orthopedic Surgery, Maastricht, Netherlands

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

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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 Pauly², 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, Filippos Kasiotis¹, Aikaterini - Evanthia Gkanatsiou¹, Natalia Kitsouli¹, Konstantinos Vassil¹, 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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² University College Dublin, School of Public Health- Physiotherapy & Sports Science, Dublin, Ireland

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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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 Sansgiri¹, 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

Michèle 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 Mühlring², Johannes Gabel³, Peter Augat², Andreas Brand²

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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. Swanholm³, 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, Elodie 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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² Máxima MC, Department of Orthopaedic Surgery & Trauma, Eindhoven, Netherlands

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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² University Hospital Frankfurt, Department of Orthopedics Friedrichsheim, Frankfurt am Main, Germany

³ University Hospital Frankfurt, Dr. Rolf M. Schwiete Research Unit for Osteoarthritis, Frankfurt am Main, Germany

⁴ St. Pölten University of Applied Sciences, Center for Digital Health & Social Innovation, St. Pölten, Austria

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 Schöllborn²,

Matthias Zeppelzauer¹, Brian Horsak³

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

² Johannes Gutenberg-University Mainz, Institute of Sport Science, Mainz, Germany

³ St. Pölten University of Applied Sciences, Center for Digital Health & Social Innovation, St. Pölten, Austria

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 Yulduz¹, 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 Vijaklija³, 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

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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, Hannab Carey², Jente Willaert², Bram Van Den Bosch³, Kaat Desloovere³, Anja Van Campenbout^{4,5}, Friedl De Groot²

¹ Universitat Politècnica de Catalunya, Department of Mechanical Engineering, Barcelona, Spain

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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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⁵ Utrecht University, Corporate Offices- Student & Academic Affairs Office- Education- Education Policy, Utrecht, Netherlands

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 Campenbout³, 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 Aldabondo², Andy Ries³, Michael Schwartz³

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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 Campenhour^{4,5}, Kaat Desloovere^{1,2}

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⁴ University Hospital Leuven, Orthopedics, Leuven, Belgium

⁵ KULeuven, Development and Regeneration - Organ Systems, Leuven, Belgium

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,c1,2}, *Astrid Bieger*^d, *Melinda Witbreuk*³, *Annemieke Buizer*^{1,2,4}, *Marjolein van der Krogt*¹

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³ Amsterdam UMC, Orthopedic Surgery, Amsterdam, Netherlands

⁴ Emma Children's Hospital, Amsterdam UMC, Amsterdam, Netherlands

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

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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, Juba- M. Hijmans³

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

- ¹ Copenhagen University Hospital- Amager-Hvidovre, Human Movement Analysis Laboratory- Department of Orthopaedic Surgery, Hvidovre, Denmark
- ² University of Southern Denmark, Department of Clinical Research, Odense, Denmark
- ³ Odense University Hospital, Department of Orthopaedics and Traumatology, Odense, Denmark
- ⁴ University College Copenhagen- Denmark, Department of Physiotherapy and Occupational Therapy, Copenhagen, Denmark

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 Rablf², Julie Ladeby Erichsen², Christian Førgemann², Bjarke Viberg³, Anders Holsgaard-Larsen²

- ¹ Odense University Hospital, H.C Andersen Children's Hospital, Odense C, Denmark
- ² Odense University Hospital, Department for Orthopaedic Surgery and Traumatology, Odense, Denmark
- 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 Wellenbergh⁴, Mario Maas⁴, Annemieke Buizer^{2,3,5}, Ajay Seth¹

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- ² Amsterdam UMC location Vrije Universiteit Amsterdam, Rehabilitation Medicine, Amsterdam, Netherlands
- ³ Amsterdam Movement Sciences, Rehabilitation & Development, Amsterdam, Netherlands
- ⁴ Amsterdam UMC location University of Amsterdam, Radiology and Nuclear Medicine, Amsterdam, Netherlands
- 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

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² *KU Leuven, Department of Mechanical Engineering Biomechanics Section, Leuven, Belgium*

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

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² *St. Pölten University of Applied Sciences, Degree Program Gait Analysis and Rehabilitation, St. Pölten, Austria*

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}

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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

² Stellenbosch University, Department of Exercise- Sport and Lifestyle Medicine, Stellenbosch, South Africa

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, Nicolò Monaco², Garazi Casillas Martinez^{1,3}, Federica Cibirn², Fabiola Spolaor¹, Annamaria Guiotto¹, Zimi Sawacha^{1,4}

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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, Mbairi McInnes², Dimitra Blana¹

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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

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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

¹ Instituto de Biomecánica de Valencia - Universitat Politècnica de València, Biomechanical Assessment, Valencia, Spain

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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 Xaver¹, 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 Kulic², Katja Mombauro³

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 Atrsaei¹, Fabien Masse², Stéphane Armand², Kamiar Aminian³, Florent Moissenet⁴

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

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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 Criekinge (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

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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

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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 Harbaus³, 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}

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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 Hanssen², Rhea Spong-Cruden³, Delaja Plein⁴, Chelsi Bardan⁴,

Ruby Chin A Fat⁵, Marlies Declerck⁵, Lynn Bar-On⁶, Anja Van Campenhout^{2,7}, Kaat Desloovere^{2,8}

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

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

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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

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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 Mustafaoglu², 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 *JOHANNEUM 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*

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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 Meijneke³, 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 Keklicek¹

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*

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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 Mekbael¹, 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 Musagara¹, Marco Götze¹, Sebastian I. Wolf^f

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 Reising¹, Mehrdad Davoudi¹, Marco Götze¹, Firooz Salami¹, Sebastian Wolf^f

¹ Orthopädische Universitätsklinik Heidelberg, Heidelberg Motionlab, Heidelberg, Germany

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

Firooz 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 Criekinge³, 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 Leboeuf¹, 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}

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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 *TU Delft, 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}, Miriam Febrer-Nafria³, Geert Verheyden⁴, 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 Vlieger¹, Robbe De Baets¹, Kristine Oostra², Dirk Cambier¹, Hanne Maebe³, Koen Matthys⁴, Pieter Meyns⁵, Anke Van Bladel¹

¹ Ghent University, Rehabilitation sciences, Ghent, Belgium

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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, Turino, 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, Turino, 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

¹ Istanbul Ortopediatri, Physiotherapy and Rehabilitation, Istanbul, Turkey

² Istanbul Ortopediatri, Orthopedics and Traumatology, Istanbul, Turkey

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

Barış Görgün¹, Meltem Celik², Osman Doğan², İlker Abdullah Sarıkaya¹, Ozan Ali Erdal¹, Onur Oto¹, Muharrem İnan¹

¹ Istanbul Ortopediatri, Orthopedics and Traumatology, Istanbul, Turkey

² Istanbul Ortopediatri, Physiotherapy and Rehabilitation, Istanbul, Turkey

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

Carolina Escalda¹, Marta Ferreira², Rodrigo Mateus², Filipa João², António Veloso²

¹ Hospital Garcia D'orta, Orthopediatrics, Almada, Portugal

² Faculty of Human Kinetics- University of Lisbon, Biomechanics, Lisbon, Portugal

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

Maria Gkaraveli^{1,2}, Theofani Bania³, Pavlos Morfis⁴, Eirini Grammatopoulou¹, Vasiliki Sakellari¹

¹ University of West Attica- School of Health and Care Sciences, Department of Physiotherapy, Athens, Greece

² ELEPAP-Rehabilitation for The Disabled, Gait Lab, Athens, Greece

³ University of Patras- School of Health Rehabilitation Sciences, Department of Physiotherapy, Rio, Greece

⁴ National and Kapodistrian University of Athens, Department of Medicine, Athens, Greece

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

Marybeth Grant-Beuttler¹, Richard Beuttler², Michael Shirraishi³, Michelle Gwerder⁴, Jacklyn Asher⁵, Christine Jeng⁵, Migyeong Gwak⁶, Afshin Aminian⁷, Majid Sarrafzadeh⁶, Rabul Soangra⁵

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² Chapman University, School of Pharmacy, Irvine- California, USA

³ Chapman University-Crean School of Health and Behavioral Sciences, Physical Therapy, Irvine- California, USA

⁴ ETH Zurich, Institute for Biomechanics, Zurich, Switzerland

⁵ Chapman University- Crean College of Health and Behavioral Sciences, Physical Therapy, Irvine- California, USA

⁶ University of California- Los Angeles, Computer Science, Los Angeles- California, USA

⁷ Children's Hospital of Orange County, Department of Orthopedics, Orange- California, USA

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

Matthias Hösli¹, Antonia Thamm¹, Sean Nader², Steffen Berweck³

¹ Schön Klinik Vogtareuth, Gait and Motion Analysis Laboratory, Vogtareuth, Germany

² Schön Klinik Vogtareuth, Paediatric Orthopaedics, Vogtareuth, Germany

³ Schön Klinik Vogtareuth & LMU Munich, Department of Pediatric Neurology & LMU Hospital- Department of Pediatrics – Dr. von Hauner Children's Hospital- Division of Pediatric Neurology and Developmental Medicine & LMU Center for Children with Medical Complexity, Vogtareuth, Germany

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

Andreas Karamolegkos¹, Emmanouil Skordilis¹

¹ National and Kapodistrian University of Athens, School of Physical Education and Sport Science, Athens, Greece

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

Babette Mooijekind^{1,2,3}, Lynn Bar-On³, Marjolein M. van der Krogt^{1,2}, Wouter Schallig^{1,2}, Melinda M. Witbreuk^{1,2}, Annemieke I. Buijzer^{1,2,4}

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

² Amsterdam Movement Sciences, Rehabilitation and Development, Amsterdam, Netherlands

³ Ghent University, Department of Rehabilitation Sciences, Ghent, Belgium

⁴ Emma Children's Hospital, Amsterdam UMC, Amsterdam, Netherlands

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

Juliana D. O. H. Mendes¹, Lorraine B. Cordeiro¹, Grazielly N. Santos², Fernanda B. D. Carvalho¹, Luanda A. C. Grecco^{1,3}, Pedro A. S. Ribeiro⁴, Priscilla M. Moraes⁵, Claudia Oliveira^{1,6}

¹ Evangelical University of Goiás- UniEVANGÉLICA, Postgraduate Program, Anápolis, Brazil

² Evangelical University of Goiás- UniEVANGÉLICA, Graduate Course in Physiotherapy, Anápolis, Brazil

³ Center of Pediatric Neurostimulation CENEPE – REAB, Pediatric Neurostimulation, São Paulo, Brazil

⁴ Evangelical University of Goiás- UniEVANGÉLICA, Graduate Course in Software engineering, Anápolis, Brazil

⁵ Evangelical University of Goiás- UniEVANGÉLICA, Psychology Clinical- Post-Graduate Program, Anápolis, Brazil

⁶ School of Medical Sciences- Santa Casa de São Paulo, Health Sciences Program, São Paulo, Brazil

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

Caio Aparecido P Castro¹, Natália A C Duarte², Amanda Queiróga³, Larissa P Jordão³, Marcela O Araújo², Claudia Oliveira^{1,2}, Luanda A C Grecco²

¹ School of Medical Sciences- Santa Casa de São Paulo, Health Sciences Program-, São Paulo, Brazil

² Evangelical University of Goiás- UniEVANGÉLICA, Postgraduate Program, Anápolis, Brazil

³ São Paulo Santa Casa School of Medical Sciences, Health Sciences Program, São Paulo, Brazil

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

Kubra Onerge^{1,2,3}, Rukiye Sert⁴, Nazif Ekin Akalan^{1,3}, Shavkat Nadir^{3,5}, Fuat Bilgili⁶

¹ Istanbul Kultur University, Faculty of Health Sciences- Physiotherapy and Rehabilitation Division, İstanbul, Turkey

² Hacettepe University, Graduate School of Health Sciences- Physical Therapy and Rehabilitation Division, Ankara, Turkey

³ Istanbul Kultur University, Motion Analysis Center, Istanbul, Turkey

⁴ Istanbul University, Institute of Health Sciences- Department of Pediatric Basic Sciences- Developmental Neurology, Istanbul, Turkey

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

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

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

Kubra Onerge^{1,2,3}, Mervener Arslan¹, Nazif Ekin Akalan^{1,3}, Rukiye Sert⁴, Halenur Evrendilek^{1,3,5}

¹ Istanbul Kultur University, Faculty of Health Sciences- Division of Physiotherapy and Rehabilitation, İstanbul, Turkey

² Hacettepe University, Graduate School of Health Sciences- Physical Therapy and Rehabilitation Division, Ankara, Turkey

³ Istanbul Kultur University, Motion Analysis Center, Istanbul, Turkey

⁴ Istanbul University, Institute of Health Sciences- Department of Pediatric Basic Sciences- Developmental Neurology, Istanbul, Turkey

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

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

Mervenur Arslan¹, Rukiye Serr², Kubra Onerge^{1,3,4}, Halenur Evrendilek^{1,3,5}, N. Ekin Akalan^{1,3}, Fuat Bilgili⁶

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⁵ *Istanbul University Cerrahpasa, Institute of Health Sciences, Istanbul, Turkey*

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

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

Yunus Ozdemir¹, Nazif Ekin Akalan², Yener Temelli³

¹ *Istanbul Medipol University, Department of Physiotherapy and Rehabilitation, Istanbul, Turkey*

² *Istanbul Kultur University, Motion Analysis Center, Istanbul, Turkey*

³ *American Medical Center, Department of Orthopedics and Traumatology, Istanbul, Turkey*

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

Mika Peltoniemi^{1,2}, Taija Finni², Helena Mäenpää¹, Harri Piitulainen^{1,2}, Juha-Pekka Kulmala¹

¹ *Helsinki University Hospital, Motion Laboratory- New Children's Hospital, Helsinki, Finland*

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

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

Maria Cristina Bisi¹, Anna Fetta², Luca Soliani³, Federica Sperandeo³, Anna Utili³,

Duccio Maria Cordelli², Rita Stagni¹

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

² *University of Bologna, Department of Medical and Surgical Sciences - DIMEC, Bologna, Italy*

³ *IRCCS Institute of Neurological Sciences of Bologna, UOC Neuropsychiatry of the Pediatric Age, Bologna, Italy*

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

Patricia Van De Walle¹, An Jansen², An-Sofie Schoonjans³, Anke Van Dijk³, Colette Puts⁴, Iris Van Hal⁴, Marijn Weren⁴, Kinaci Esra⁵, Ann Halleman⁴

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⁴ *University of Antwerp, Movant, Antwerpen, Belgium*

⁵ *Hacettepe University, Physical Therapy and Rehabilitation, Istanbul, Turkey*

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

Ruby Chin A Fat¹, Delaja Plein², Daphny Lieuw¹, Fenna Walhain³, Britta Hanssen⁴, Safir Liesdek⁵, Rhea Cruden⁶, Chelsi Bardan², Sarfaraz Muradin⁷, Marlies Declerck¹

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³ Anton de Kom University of Suriname, Anatomy, Paramaribo, Suriname

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⁵ Academic Hospital Paramaribo, Neonatology, Paramaribo, Suriname

⁶ Academic Hospital Paramaribo, Neurology, Paramaribo, Suriname

⁷ Anton de Kom University of Suriname, Faculty of Medical Sciences, Paramaribo, Suriname

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

Lane Wimberly¹, Elizabeth Bunkell², Kelly Jeans²

¹ Scottish Rite Hospital, Orthopaedic Surgery, Dallas, USA

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

Normative studies

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

Osnat Atun-Einy¹, Inna Farkash¹

¹ University of Haifa, Department of Physical Therapy, Haifa, Israel

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

Sebastian Durstberger¹, Klaus Widhalm^{1,2}, Peter Putz¹

¹ FH Campus Wien University of Applied Sciences, Department Health Sciences, Vienna, Austria

² Paracelsus Medical University, Institute for Biomechanics, Salzburg, Austria

P 023 ECG noise removal using wavelet transform during the gait

Seyede Mahsa Zarei¹, Nahid Yadegari Moghadam¹, Mina Barikani¹, Fatemeh Mojaver¹, Nikoo Asadi¹, Nima Haghghi¹, Meroeh Mohammadi¹

¹ Islamic Azad University, Biomedical Engineering, Teheran, Islamic Republic of Iran

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

Klaus Widhalm^{1,2}, Sebastian Durstberger¹, Peter Putz¹

¹ FH Campus Wien University of Applied Sciences, Department Health Sciences, Vienna, Austria

² Paracelsus Medical University, Institute for Biomechanics, Salzburg, Austria

Movement analysis methodology

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

Sylvia Augustine¹, Raihana Sharir^{1,2}, Gabor Barton¹, Richard Foster¹, Mark Robinson¹

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

² Universiti Teknologi Mara- Shab Alam- Malaysia, Faculty of Sports Science and Recreation, Selangor, Malaysia

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

Shayan Babadori¹, Jonathan Williams², Sarah Collard³, Ian Swain¹

¹ Bournemouth University, Orthopaedic Research Institute, Bournemouth, United Kingdom

² Bournemouth University, Health and Social Sciences, Bournemouth, United Kingdom

³ Bournemouth University, Science and Technology, Bournemouth, United Kingdom

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

Chris Baten¹, Maaïke de Bondt², Thijs Leenders¹, Sanchana Krishnakumar², Vinish Yogesh¹, Andrea Cereatti³, Jaap Buurke¹

¹ Roessingh Research and Development, Ambulatory 3D Analysis of Human Movement, Enschede, Netherlands

² University of Twente, eemcs, Enschede, Netherlands

³ Polytechnic University of Turin, Department of Electronics and Telecommunications, Turin, Italy

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

Gabor Barton¹, Jacob Beesley¹, Jasmine Milnes², Gabriela Czanner³, Lynne Boddy¹

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

² University Hospitals Derby and Burton NHS Foundation Trust, Derby Gait and Movement Laboratory- Derby- United Kingdom, Derby, United Kingdom

³ Liverpool John Moores University, School of Computer Science and Mathematics, Liverpool, United Kingdom

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

*Federica Camunco- ¹ Politecnico di Milano, Department of Electronics Information and Bioengineering, Milano, Italy
- ² Politecnico di Milano, Department of Mechanical Engineering, Milano, Italy
- ³ IRCCS Eugenio Medea, Associazione La Nostra Famiglia, Bosisio Parini, Italy*

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

Serena Cerfoglio^{1,2}, Paolo Capodaglio^{2,3}, Rossi Paolo⁴, Verme Federica², Boldini Gabriele², Cvetkova Viktoria⁴, Galli Manuela¹, Cimolin Veronica^{1,2}

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³ *University of Turin, Department of Surgical Sciences- Physical Medicine and Rehabilitation, Turin, Italy*

⁴ *Clinica Hildebrand - Centro di Riabilitazione Brissago, Neurology Unit, Brissago, Switzerland*

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

Nicolaos Darras¹, Corey Joseph¹, Anna Murphy¹

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

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

Ludovica Bottini¹, Giacomo Di Raimondo², Bryce Adrian Killen², Zimi Sawacha¹, Ilse Jonkers²

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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?

Silvia Filogna¹, Elena Beani^{1,2}, Giada Martini², Beatrice Ceragioli², Elia Guidi³, Francesco Lenci³, Giovanni Cioni^{1,2}, Giuseppina Sgandurra^{1,2}

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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**

Rami Mizuta¹, Noriaki Maeda¹, Junpei Sasada², Reia Shimizu², Akira Suzuki³, Makoto Komiya¹, Kazuki Fukui³, Tsubasa Tashiro¹, Shogo Tsutsumi¹, Yukio Urabe¹

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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

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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

P 112 Pressure measurements in the shoulder region of police officers wearing equipment vests

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P 113 ☆ Exploring the potential of combining kinematics and EMG to enhance identification of individuals with subacromial shoulder pain

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P 114 Modulation of trunk symmetry using sensory stimulation in post-stroke patients: The study design

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P 115 The relation between bimanual coordination, lesion timing, and corticospinal tract wiring pattern in children with unilateral cerebral palsy

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P 116 Investigating gait behavior in children with scoliosis diagnosed Juvenile Idiopathic Arthritis: Pilot Study

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P117 Impact of static postures on scaling accuracy of shoulder complex: Motion analysis and simulation study

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P118 Identification of movement and muscle activity patterns in young people with and without shoulder instability

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P119 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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P120 Biomechanical evaluation of the upper extremity in patients with osteogenesis imperfecta – a pilot study

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P121 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

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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

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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**

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P 128 **Knee flexion while walking versus knee contractures in children with bilateral spastic cerebral palsy**

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P 129 **The effect of bilateral heel wedge on lower extremity kinematics during walking for children with hypermobility**

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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**

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P131 Trochanteric prominence angle test (TPAT)! What is it good for?

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Foot and ankle

P134 How saddle height changes the hip kinematics pattern in different degree of freedom

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P136 Comparison of the effects of low-dye and kinesiio taping in plantar fasciitis

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P137 Foot symptoms and associated proximal joint dysfunctions in paediatric flatfoot

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P138 Which strategy is dominant in functional ankle instability individuals during gait walking?

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P139 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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