

The international Foot and Ankle Biomechanics community

1st i-FAB Congress

4-6 September 2008

***Centro di Ricerca Codivilla-Putti
Istituto Ortopedico Rizzoli,
[IOR Research Centre]
Bologna, Italy***



***Congress Chair
Dr Alberto Leardini***

Programme schedule

Thursday, 4th September 2008

8.00 – 17.30 Registrations, IOR Research Centre

Tutorials:

7.30 A- Total ankle replacement, operation live by prof. Sandro Giannini; video-audio connection in Aula Campanacci, IOR hospital

9.00 B- Anatomy of the Foot and Ankle, dissection live (Andrea Ensini, Luca Bianchi); Movement Analysis Laboratory, Sala del Federalismo, IOR Research Centre

11.00 C1- Biomechanics of the Developing Human Foot (Sorin Siegler); Auditorium, IOR Research Centre

11.00 C2- Multi-segment Foot Kinematics In-vivo: hands-on (Maria Grazia Benedetti, Ilse Jonkers, Julie Stebbins, Sebastian Wolf) - Movement Analysis Laboratory, IOR Research Centre

12.00 Welcome reception Bar/Caffetteria, IOR Research Centre

13.00 – 13.30 Opening Auditorium, IOR Research Centre

13.30 – 14.00 Key Lecture 1

Harold Kitaoka (Department of Orthopedics, Mayo Clinic, USA): Advances in biomechanics of posterior tibial tendon dysfunction and flatfoot deformity

14.00 – 15.30 Oral Session 1, Pathological Foot

Chairmen: Sandro Giannini and Martinus Richter

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| O1 | Chang R | Energetics of the intrinsic foot muscles in plantar fasciitis |
| O2 | Ledoux WR | Clawed toes in the diabetic foot: neuropathy, intrinsic muscle volume, and plantar aponeurosis thickness |
| O3 | Sawacha Z | The role of shear stress in the aetiology of diabetic neuropathic foot ulcers |
| O4 | Rao S | Plantar fascia thickness and first metatarsal mobility in patients with diabetes and neuropathy |

- O5 Burns J Evolution of foot manifestations in children with Charcot-Marie-Tooth disease
- O6 Nawoczenski DA Comparison of the clinical Heel Rise test in subjects with Stage II PTTD and healthy controls
- O7 Delahunt E The effects of taping and exercise on ankle joint movement in subjects with functional instability of the ankle joint during a jump down

15.30 – 16.45 Coffee Break & Poster Session 1

Chairmen: William Ledoux and Debbie Nawoczenski

- P1 Hennig E Foot pain and body weight - results from 4000 german children - part of an international study on foot function and childhood obesity
- P2 Forghany S The effects of stroke on foot kinematics
- P3 Giacomozzi C Biomechanics of the diabetic neuropathic foot: altered GRF during propulsion
- P4 Hsu HC Biomechanical analysis of landing patterns in subjects with recurrent lateral ankle sprains
- P5 Romkes J Foot characteristics and body weight - a study of 1038 Swiss children: part of an International Study on Foot Function and Childhood Obesity
- P6 Wegener C Effect of custom orthoses on foot pain and plantar pressure in people with diabetes mellitus and peripheral arterial disease
- P7 Mauch M Foot discomfort in 6-14-year-old normal and overweight children
- P8 Rao S Comparison of in-vivo segmental foot mobility during walking and step descent in patients with midfoot arthritis
- P9 Sawacha Z Type of foot contribution in the biomechanics of the diabetic foot
- P10 de David AC Gait parameters in children with flexible flat foot
- P11 Nawoczenski DA Clinical predictors of forefoot dorsiflexion during a bilateral heel rise task in subjects with Stage II posterior tibial tendon dysfunction
- P12 Begg L Offloading the diabetic foot ulcer: comparison of total contact casting techniques

- P13 Simonsen O Increased foot pronation among 16 to 18 year old high-school students with patellofemoral pain syndrome
- P14 Ursino S Correlation between surface EMG and kinematics-kinetics-plantar pressure analysis of diabetic neuropathic foot
- P15 Matricali GA Rigid hallux valgus correction to reduce detrimental plantar pressures causing a recurrent malum perforans
- P16 Lu TW Dynamic foot pressure in patients with hallux valgus during stair climbing
- P17 Riganti S Late presentation of foot deformities in totally involved Cerebral Palsy patients
- P19 Wetz HH Reconstructive foot surgery in Charcot arthropathy
- P20 Ingrosso S Gait analysis of a novel design of ankle replacement
- P21 Puchmeltrova M Retrospective evaluation of the hallux metatarsophalangeal joint replacement
- P22 Richter M Reconstructive foot and/or ankle surgery improves preoperative pathologic pedographic findings at 3-months-follow-up
- P23 Balestri M Tibial remodelling after fibula harvesting: an in-vivo quantitative estimation
- P24 de David AC Effects of ankle cryotherapy in postural stability
- P25 Delahunt E An investigation into the effects of ankle taping on lower limb joint angular displacements and ground reaction forces during a single leg drop landing in healthy male subjects

16.45 – 17.15 Key Lecture 2

George Arangio (Department of Orthopedics, M.S. Hershey Medical College, USA): Sailing charted seas: biomechanics and the orthopedic surgeon

17.15 – 18.20 Oral Session 2, Foot and Ankle Surgery

Chairmen: Peter Cavanagh and George Arangio

- O8 O'Connor JJ Preliminary results of a biomechanics driven design of a total ankle prosthesis
- O9 Matricali GA Pressure profile changes after cartilage biopsy at the postero-medial rim of the talar dome

- O10 Richter M Robotic cadaver testing of a new total ankle prosthesis model
(German Ankle System)
- O11 Kuo CC Ankle morphometry in Chinese population
- O12 Nawoczinski DA In-vivo first metatarsophalangeal joint mechanics following
Cheilectomy: MRI and gait alterations

18.20 – 19.00 Web-services demonstration

Friday, 5th September 2008

7.30 – 12.30 Registrations

8.00 – 8.30 Key Lecture 3

Mario Lafortune (Nike Sport Research Laboratory, USA): The role of research in the development of athletic footwear

8.30 – 10.00 Oral Session 3, Shoes, Sport & Performance

Chairmen: Sebastian Wolf and Chris Nester

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| O13 | Hagen M | Effects of different shoe lacing patterns on perceptual variables and dorsal pressure distribution in heel-toe running |
| O14 | Baur H | Therapeutic efficiency and biomechanical effects of sport insoles in female runners |
| O15 | Davis IS | Rearfoot and knee coupling over a prolonged run in runners with patellofemoral pain syndrome |
| O16 | Heidenfelder J | Heel strike angle and foot angular velocity in the sagittal plane during running in different shoe conditions |
| O17 | Castro MA | Biomechanical analysis of an inciting event of ankle sprain on basketball players |
| O18 | Deleu PA | Impact of 90 minutes running exercise on plantar loading of the forefoot: a prospective study on symptom-free athletes |
| O19 | Zhang S | Efficacy of an ankle orthosis with a subtalar locking system in restricting ankle kinetics and kinematics in lateral cutting |

10.00 – 10.30 Coffee Break & Poster Session 2

Chairmen: Ewald Hennig and Thorsten Sterzing

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|-----|------------------|------------------------------------------------------------------------------------------------------------------------|
| P26 | Gapeyeva H | Muscle tone, elasticity and stiffness of calf muscles in young ballerinas with overload of foot and ankle joint |
| P27 | Sterzing T | Bridge modifications of running shoe heel area influence rearfoot motion parameters |
| P28 | Hagen M | Identification of angle-dependent dorsiflexor strength development for optimization of a variable-cam training machine |
| P29 | Shariatmadari MR | Performance of EVA footwear foam under dynamic compressive |

loading

- P30 Fukano M Foot arch kinematics of barefoot and shod landing
- P32 Dedieu P Changes in ankle kinematics during walking/running with or without swinging arms
- P33 Ozyurek S The assessment of ankle strategy in professional dancers

10.30 – 11.00 Key Lecture 4

Peter Cavanagh (Department of Biomedical Engineering, Cleveland Clinic, USA):
Biomechanical factors in diabetic foot disease

11.00 – 12.20 Oral Session 4, Pedography

Chairmen: Joshua Burns and Dieter Rosenbaum

- O20 Bosch K From “first” to “last” steps in life – pressure patterns of three generations
- O21 Edwards WB Foot joint pressures during dynamic gait simulation
- O22 Stebbins J Correlation between plantar pressure and Oxford Foot Model kinematics
- O23 Orendurff M Metatarsal fracture mechanism: accelerating loads the fifth ray more than cutting
- O24 Richter M Pedographic findings in 461 patients in a foot and ankle outpatient clinic – definition of standard pedographic patterns for typical pathologies
- O25 Pataky TC New insights into stance phase foot biomechanics using pedobarographic statistical parametric mapping

12.20 – 13.30 Poster Session 3

Chairmen: Julie Stebbins and Claudia Giacomozzi

- P34 Cong Y Biomechanical evaluation of shank curves of high-heeled shoes
- P35 Rathgeber T Correlation between foot pronation and overcrossing while running
- P36 du Toit V Angular motion and joint moments at the ankle during aerobic dance movements

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| P37 | Daisuke K | Biomechanical effect of Waraji-like footwear on walking and standing |
| P38 | Zhang S | Coordination in running within high- and low-arched feet |
| P39 | Cong Y | Biomechanical effects of size and shape on footwear fit |
| P40 | Shultz R | Foot kinematics during barefoot running and lateral cutting |
| P41 | Shariatmadari MR | Performance of EVA footwear foam under static pressure and shear force loading |
| P42 | Chirco S | Walking and hells: effects in healthy and flat foot |
| P43 | Tekautz P | Correlation between foot pronation and foot rotation while running |
| P44 | Hömme AK | Analysis of foot morphology and plantar pressures of school children |
| P45 | De Mits S | The relationship between the foot posture index and plantar pressure measurements |
| P46 | Keijsers NLW | Normalization of plantar pressure distribution pattern |
| P47 | Giacomozzi C | Biomechanical interpretation of pressure pattern alterations in diabetes and reumatoid arthritis: the support of cluster analysis |
| P48 | Stolwijk NM | Redistributing plantar pressure; a detailed description of the effect of insoles on plantar pressure distribution in patients with common foot complaints |
| P49 | Deschamps K | Inter- and Intra-observer reliability of landmark placement in plantar pressure measurements |
| P50 | Olesen CG | Does excessive pronation cause pain? |
| P51 | D'Amico M | Normalisation and averaging of baropodographic maps for foot/floor interaction study |
| P52 | Wolf S | CoP data measured with an insole pressure system in a global reference frames |
| P53 | Demirbuken I | Relationship between balance control and footprint parameters |

13.30 – 14.15 Buffet Lunch

14.15 – 14.45 Symposium presentation of the European Footwear Technology**14.45 – 16.15 Oral Session 5, Motion Analysis**

Chairmen: Irene Davis and Mario Lafortune

- O26 Wolf S Foot motion in children and adults
- O27 Rao S Shoe inserts alter inter-segmental foot motion and provide symptomatic relief in patients with midfoot arthritis
- O28 McCahill J Use of the Oxford Foot Model in clinical practice
- O29 Shultz R Validation of windows for examining kinematics of the foot with respect to the shoe using a multi-segment foot model
- O30 Benedetti MG A new protocol for complete 3D kinematics analysis of the ankle foot complex in stroke patients
- O31 Rouhani H 3D foot joints angle description using projected lines on anatomical planes
- O32 Krauss I Comparison of gait data using two different protocols for ankle joint kinematics

16.15 – 17.15 Coffee Break & Poster Session 4

Chairmen: Smita Rao and Maria Grazia Benedetti

- P54 Biagi F Skeletal-based animation in multi-segment foot kinematics
- P55 Benedetti MG Comparison of outputs of different models for multi-segment foot kinematics
- P56 D'Amico A Validation of current protocols for multi-segment foot kinematics by elementary joint motion
- P57 Rosenbaum D Effects of medial longitudinal arch supports on three-dimensional foot motion in high and low arched healthy adolescents
- P58 Ball KA Standardized marker sets are unnecessary: the functional alignment procedure
- P59 Orendurff M Acceleration during walking is modulated by the ankle
- P60 Jensen K A new motion capture system for automated gait analysis based on multivideo sequence analysis
- P61 Rabuffetti M Linked-body model of the foot: identification of a minimal marker set

- P62 Tulchin K Multi-segment foot motion changes with speed
- P63 Ball KA Revisiting the ISB recommendation for analysis of ankle movement
- P64 Shultz R Effect of neutral trial conditions on reported foot kinematics
- P65 Peeraer L Prediction of 3-D rearfoot motion based on plantar pressure distribution data during stance
- P66 Mølgaard C Pain reduction in patients with patellofemoral syndrome and hyperpronation treated with orthoses and foot training
- P67 Kogler GF The influence of concave orthotic relief's at the second metatarsal head on plantar foot pressures during walking
- P68 Roosen Ph Plantar pressure measurements while using an Aircast Airlift™ PTTB brace and a Bota ortoAB950 brace
- P69 Bae TS Effect of prosthetic foot eversion on knee and ankle of transtibial amputees
- P70 Rosenbaum D Vacuum cushioned removable cast walkers reduce foot loading in patients with diabetes mellitus
- P71 Cho HS Finite element analysis of the active prosthetic foot for trans-tibial amputee
- P72 du Toit V How effective are orthoses in the treatment of exertional medial shin pain? - a protocol
- P73 Avagnina L The plantar orthotic therapy in forefoot pain with biomechanical origin

17.15 – 18.30 Consensus Meeting A: International standards for terminology of the foot and ankle biomechanics, chaired by Thomas Greiner

17.30 – 18.30 Visit to the hospital-monastery-library A [IOR hospital]

20.30 Social dinner [Cantina Bentivoglio via Mascarella 4/B - Bologna city centre]

Saturday, 6th September 2008

7.30 – 10.30 Registrations

8.00 – 8.30 Key Lecture 5

Sorin Siegler (Department of Mechanical Engineering and Mechanics, Drexel University, USA):
Advances in image-based biomechanics of the human ankle

8.30 – 9.50 Oral Session 6, Medical Imaging Analyses

Chairmen: Sorin Siegler and Rita Stagni

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| O33 | Yamaguchi S | In vivo talocrural and subtalar kinematics during nonweightbearing and weightbearing dorsiflexion-plantarflexion activities |
| O34 | Blankevoort L | The accuracy of a CT-based bone segmentation technique for measuring the range of motion of the joints in the ankle |
| O35 | Sheehan FT | Direct in-vivo quantification of the 3D talocrural and subtalar finite helical axes |
| O36 | Lu TW | Validation of a voxel-based 2-D to 3-D registration method for measuring natural ankle kinematics with single plane fluoroscopy |
| O37 | Nielsen RG | The predictive value of the foot posture index on dynamic function |
| O38 | Drerup B | Objective foot ulcer documentation using 3-D shape analysis: a feasibility study |

9.50 – 10.30 Coffee Break & Poster Session 5

Chairmen: Frances Sheehan and Tung-Wu Lu

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| P74 | Sheehan FT | In-vivo quantification of the Achilles tendon moment arm |
| P75 | Petrolo L | Mechanics of foot and ankle by synchronised measurements from single plane video-fluoroscopy and force plates: preliminary assessments |
| P76 | Rathleff M | Navicula height – static versus dynamic |
| P77 | Siegler S | The effect of loads applied to the infant congenital clubfoot through serial casting on shape, growth and ossification of hindfoot anlagen |
| P78 | Conti G | Comparison of different reference systems for the human tibia and fibula |
| P79 | Sancisi N | Helical axis calculation for human tibiotalar joint motion based |

on Burmester theory

- P80 Franci R An efficient tool for ligament-bone contact simulation
- P81 Rouhani H Bone embedded anatomical frame definition for multi-segment foot motion description
- P83 Siegler S Relationship between morphology of the ankle joint complex and its mechanics revealed through subject-specific models

10.30 – 11.00 Key Lecture 6

Marco Viceconti (Laboratorio Tecnologia Medica, Istituto Ortopedico Rizzoli, Italy):
Multiscale modelling and team science: the future of orthopaedic biomechanics

11.00 – 12.30 Oral Session 7, Modelling

Chairmen: Alex Stacoff and Amy Zavatsky

- O39 Greiner TM The calcaneocuboid joint moves with three degrees of freedom
- O40 Zavatsky AB Reducing rigid-body error in a functional technique to determine ankle joint axes
- O41 Stagni R A biomechanical model of percutaneous distal metatarsal osteotomy: load transmission influencing successful follow-up
- O42 Caravaggi P Evidence for early stance phase pre-loading of the plantar aponeurosis
- O43 Stephenson J Bearing surface modeling of the talus and calcaneus
- O44 Parenti-Castelli V New spatial mechanisms for the kinematic analysis of the tibiotalar joint
- O45 Ledoux WR A finite element foot model for simulating muscle imbalances

12.30 – 13.30 Consensus Meeting B: Towards consensus of reference co-ordinate systems, chaired by Sorin Siegler

13.30 – 14.00 Lunch at the Bar/Caffetteria

14.00 – 14.15 Poster Session 6

Chairmen: Vincenzo Parenti-Castelli and Angelo Davalli

- P84 Matricali GA Changes in contact area characteristics of the ankle after cartilage biopsy at the postero-medial rim of the talar dome

- P85 Spinelli M Total ankle prosthesis: preliminary experimental results on wear rates
- P86 Matricali GA High inter-specimen variability of baseline data for the tibio-talar contact area
- P87 Moon JP Finite Element Analysis on foot pressure changes in relation to outsole hardness
- P88 Creylman V Finite Element Analysis of ankle foot orthoses
- P89 Ruperez MJ A methodology to measure the pressure on the foot surface in a virtual way

14.15 – 15.45 Oral Session 8, Foot & Ankle Biomechanics

Chairmen: Giovanni Matricali and Leendert Blankevoort

- O46 Hawke F Custom foot orthoses for the treatment of foot pain: a systematic review
- O47 Richter M Intraoperative pedography – development, validation and clinical use of a novel method for intraoperative biomechanical assessment
- O48 Peeters K Effect of external loading on in vitro measured muscle induced calcaneal and talar motion
- O49 Brauner T Gradual increase of varus angle of running shoes gradually reduces pronation while maintaining cushioning properties
- O50 Greiner TM Assessing talonavicular joint rotations in three dimension
- O51 Alimusaj M Effects of an active prosthetic ankle during ambulation on stairs and ramps
- O52 Vannini F Functional evaluation of patients treated with osteochondral allograft transplantation for post-traumatic ankle arthrosis

15.45 – 16.00 Concluding Remarks and Closing Ceremony,**16.00 – 17.30 Visit to the hospital-monastery-library B [IOR hospital]**