5th World Congress of Biomechanics

incorporating the
15th Congress of the European Society of Biomechanics
31st Congress of the Société de Biomécanique
4th ESEM International Symposium on Microdamage

Scientific Program
according to days

Date: 28.7.06
German-Indian Workshop-Clean Room Technology
11:00-16:00
G0.01

11:00-11:15 Welcome address
Minister Dr. P. S. Rana (Hoursing and Urban Development Corp. Ltd.
V. K. Katiyar
D. Liepsch

11:15-11:30 Fundamentals in Clean Room Technology-Special Considerations for the Operating Room
D Liepsch

11:30-11:50 Clean Room Developments for Hospitals and Their Applications
Dipl. Ing. K. Friedman

11:50-12:10 Clean and Controll Environment
V. K. Katiyar

12:10-12:25 Design for Clean Technology
R. K. Jain

12:25-12:40 Electronically Clean Room
R. K. Pandita

12:40-14:00 Lunch

14:00-14:15 Image Processing in Health Care Management
R. Balasubramanian

14:15-14:30 Clean Room for Orthopedic Surgery
P. K. Dave

14:30-14:45 Air-Conditioning of Health Care Facilities
R. Kumar

14:45-15:05 H. Steiger

15:05-15:25 Clinical Aspects
D. S. Gambhir

15:25-15:45 Coffee Break

15:25-16:00 Biomedical Instrumentation in Clean Room Technologies
S. C. Saxena

16:00-16:15 Utility of Clean Rooms in Pharmaceutical Industries
A. Pandey

16:15-16:30 Air-Conditioning in laboratories
K. Kuzyl

16:30-18:00 Discussion
The Finite Element Method in Biomedical Engineering, Biomechanics and Related Fields – Workshop
Organizer: Martin Geiger
Room D2.12

10:00-10:30 Finite Element Analysis of the bone remodelling process considering bone condensing around osseointegrated dental implants #7900
M. Flach, Fachhochschule Koblenz, Kompetenzzentrum für Rechnerintegrierte Produktentwicklung

10:30-11:00 Finite element simulations of skeletal muscle behaviour under tetanic and non-tetanic conditions #7897
M. Böl & S. Reese; Institute of Solid Mechanics, TU-Braunschweig, Schleinitzstr. 20, D-38106 Braunschweig

11:00-11:30 Different forms of material damping in a model of the middle ear #7899
Matthias Bornitz¹, Thomas Zahnert¹, Hans-Jürgen Hardtke²; Technische Universität Dresden; ¹ Dept. of Medicine, Clinic of Otorhinolaryngology, Fetscherstr. 74, 01307 Dresden; ² Dept. of Solid State Mechanics, 01062 Dresden

11:30-12:00 Finite Element Analysis of a New Proximal Femoral Nail (PFN-A) #7895
Helwig, P.; Faust, G.²; Hindenlang, U.; Kröplin, B.; Südkamp, N.; ¹ Dept. Orthopädie und Traumatologie, Albert-Ludwigs-Universität Freiburg; ² Institut für Statik und Dynamik der Luft- und Raumfahrtkonstruktionen, Universität Stuttgart; ³ LASSO Ingenieursgesellschaft, Leinfelden-Echterdingen

14:00-14:30 Influence of Periodontal Ligament on Initial Tooth Mobility: A FEM Study #7905
Ansgar Hohmann, Cornelia Kober, Philippe Young, Martin Geiger, Andrew Boryor, Christina Dorow, Christian Sander, Franz Günter Sander; ¹ Dept. of Engineering and Computer Science, Univ. of Applied Science Osnabrueck, Germany; ² School of Engineering, Computer Science & Mathematics, Univ. of Exeter, UK

14:30-15:00 Dental versus mandibular biomechanics: the influence of the PDL on the overall structural behaviour #7901
C. Kober, B. Erdmann, C. Hellmich, S. Stuebinger, R. Sader and H.-F. Zeilhofer; ¹ Faculty of Engineering and Computer Science, Univ. of Applied Science Osnabrueck, Germany; ² Zuse Institute Berlin, Germany; ³ Institute for Mechanics of Materials and Structures, Vienna Univ. of Technology, Austria; ⁴ Univ. of Frankfurt, Germany; ⁵ Univ. Hospital Basle, Switzerland; ⁶ Center of Advanced Studies in Cranio-Maxillo-Facial Surgery, Munich Univ. of Technology, Germany

15:00-15:30 Study of the interaction between geometry and mechanical behaviour of a lumbar spine model - consequence on the validation #7903
J. Noailly, D. Lacroix, J.A. Planell, H. Schmidt, F. Heuer, H.J. Wilke; ¹ Reference Centre for Bioengineering of Catalonia. Biomaterials and Biomechanics Division. Dept. of Materials Science. Universitat Politècnica de Catalunya, Spain; ² Institute of Orthopaedic Research and Biomechanics, Univ. of Ulm, Germany

15:30-16:00 Simulation of fracture healing in metaphyseal bone # 7902
Ulrich Simon, Sandra J. Shefelbine, Peter Augat, Lutz Claes; ¹ Institute for Orthopaedic Research and Biomechanics, Univ. of Ulm, Germany; ² Dept. of Bioengineering, Imperial College, London, UK

16:00-16:30 The Finite Element Methods in Minimal Access Surgery #7898
Chengli Song; Dept. of Surgery & Molecular Oncology, Ninewells Hospital and Medical School Univ. of Dundee, Scotland

16:30-17:00 Stress distribution and displacement analysis during an intermaxillary disjunction? A three dimensional fesa study of a human skull" #7904
Andrew Boryor, Martin Geiger, Ansgar Hohmann, Arthur Wunderlich, Franz Günter Sander; ¹ Dept. of Orthodontics, Univ. of Ulm, Germany; ² Dept. of Diagnostic Radiology, Univ. of Ulm, Germany

17:00-17:30 Numerical investigation of bone adaptation: A multiscale approach #7896
Vortragender: Tobias Ebinger; Co-Autoren: Holger Steeb, Stefan Diebels, Thorsten Tjardes
Scientific Program

Sunday, July 30, 2006

The ISB Council Meeting
Sunday 30 July, 8.00 am - 2.00 pm
Prinz Eugen Room
Hotel Eden Wolff

The World Council Meeting
Hotel Bayerischer Hof
10:00-13:00

Opening Ceremony

Sunday, July 30
Opening Ceremony
15:00-18:00
Hotel Bayerischer Hof

Welcome Address
Bavarian Minister of Arts and Sciences Dr. Thomas Goppel

Special Plenary Lectures
18:00-18:30

Human Factor-Factor Human #7695
Dr.-Ing. Peter Hupfer
TÜV-SUD

Healthcare and Technology-Innovations for the Future
Bernd Montag, Ph.D.
Siemens Medical Solutions

Welcoming Reception
Bayerische Hof Hotel Ball Room
08:15-09:45

1. Bone Mechanics – Joint ESB Track
Track Coordinators: Rik Huiskes, Reiner Gradinger
1.1.1 Advanced Detection of Bone Quality
Session Organizer: Peter Niederer, Davide Ruffoni
Monday, July 31
Room R0.055

08:15-08:30  Assessment of bone mechanical properties in-vivo with micro-FE #7890
Bert van Rietbergen

08:30-08:45  A new high resolution peripheral computed tomography scanner for monitoring patient bone quality #6507
Josh MacNeil, Steven K. Boyd; Dept. of Mechanical and Manufacturing Engineering, Human Performance Laboratory, McCaig Centre for Joint Injury and Arthritis Research, Univ. of Calgary, Alberta, Canada

08:45-09:00  Extracting trabecular geometry from tomographic images of spongy bone #5298
Chandrajit Bajaj a, Antonio DiCarlo b, Guillaume Haïat c, Pascal Laugier d, Franco Milicchio b, Salah Naiili e, Frédéric Padilla d, Alberto Paoluzzi b, Françoise Peyrin e, Giorgio Scorzelli b
a Computational Visualization Center (CVC), Univ. of Texas at Austin, USA; b Università degli Studi “Roma Tre”, Roma, Italy; c Université Paris 12, Laboratoire de Mécanique Physique, UMR CNRS 7052 B2OA, Créteil, France; d Laboratoire d’Imagerie Paramétrique, CNRS UMR 7623 – Université Paris 6, Paris, France; e CREATIS, UMR CNRS5515, INSA 502, Villeurbanne & ESRF, Grenoble, France

09:00-09:15  Prediction of the apparent elastic modulus and strength of vertebral cancellous bone based on patient-specific apparent morphology #4528
Idit Diamant a, Ron Shahar c, Youssef Masharawi b, Amit Gefen a; a Dept. of Biomedical Engineering and b Dept. of Physical Therapy, Tel Aviv Univ., Israel; c Faculty of Agriculture, Koret School of Veterinary Medicine, The Hebrew Univ. of Jerusalem, Israel

09:15-09:30  Integrated Phenotypical Characterization of Murine Vertebral Bone #4418
Nils Götzén a, Tobias Kummer b, Arndt Schilling b, Michael Amling b, Michael M. Morlock a
a Biomechanics Section, Univ. of Technology, Hamburg, Germany; b Dept. of Trauma, Hand and Reconstructive Surgery, Univ. School of Medicine, Hamburg, Germany

09:30-09:45  Strain measurements in bovine cortical bone using X-ray imaging plate system #6648
Kazuhiro Fujisaki , Shigeru Tadano; Division of Human Mechanical Systems and Design, Graduate School of Engineering, Hokkaido Univ., Sapporo, Japan

2 Musculoskeletal Mechanics-Joint ISB Track
2.1.1 Cartilage Biomechanics (Articular Cartilage)
Session Organizer: Van C. Mow
Monday, July 31
Room R1.049
08:15-08:45  Swelling and curling behaviors of articular cartilage #6449
J.H.W.Boumans, L.Q.Wan, C.V.Donkelaar, H.W.J.Huiskes and V.C.Mow
a Department of Biomedical Engineering, Eindhoven University of Technology, Eindhoven, The Netherlands; b Department of Biomedical Engineering, Columbia University, New York, USA

08:45-09:00  Ultrasonic Measurement of Dimension-Dependence of Swelling Behavior of Bovine Articular Cartilage #5406
Q. Wang and Y.P. Zheng; Dept. of Health Technology & Informatics, The Hong Kong Polytechnic Univ., Hong Kong, China

09:00-09:15  Altered cartilage mechanics in knee joints of type IX collagen deficient mice # 6037
Lcao, I Youn, C M Flahiff, Y Li, F Guila, B R Olsen, and L A Setton
a Depts Biomedical Engineering and Surgery, Duke Univ., Durham, North Carolina, USA
b Depts Cell Biology and Oral and Developmental Biology, Harvard Medical and Dental Schools, Boston, Massachusetts, USA

09:15-09:30  Extracting Poroviscoelastic Properties of Murine Cartilage from Indentation tests #6168
Narendra K. Sinha, Jack L. Lewis, Ravi Namantha, Sidharth Chirvarambath
a Biomechanics Lab, Dept. of Orthopaedic Surgery, Univ. of Minnesota, Minneapolis, MN, USA; b Dept. of Mechanical Engineering, Univ. of Miami, Coral Gables, FL, USA; c Dept. of Aerospace Engineering and Mechanics, Univ. of Minnesota, Minneapolis, MN, USA

09:30-09:45  Dependence of the Stress Relaxation Time of Cartilage Discs on Specimen Radius #6644
Ron June, David Fyhrie, Orthopaedic Research Laboratory, and Biomedical Engineering Graduate Group, Univ. of California at Davis, Sacramento, USA

2 Musculoskeletal Mechanics-Joint ISB Track

2.8.1 ACL Reconstruction

Session Organizers/Chairs: Savio L.Y. Woo, Richard E. Debski, Steve Abramowitch
Monday, July 31
Room R1.004

08:15-08:30  Tibial Tunnel Placement in Anatomic ACL Reconstruction #7878
Wolf Petersen, Thore Zantop; Dept. of Trauma-, Hand-, and Reconstructive Surgery, Wilhelms Univ. Muenster, Germany

08:30-08:45  High Stiffness Distal Fixation Restores Anterior Laxity and Stiffness As Well As Joint Line Fixation With An Interference Screw #4917
David Liu-Barba, S. M. Howell, M. L. Hull, Julia A. Koerber; Biomedical Engineering Program, Univ. of California, Davis, CA, USA; Dept. of Mechanical Engineering, Univ. of California, Davis, CA, USA

08:45-09:00  The differential contributions of the two bundles of the ACL to the control of translational and rotational laxity of the knee #4569
P Cuomo, AMJ Bull, AA Amis; Universi di Firenze, Italy; Imperial College London, UK

09:00-09:15  Mechanical functions of the three bundles of the human ACL determined with a robotic system #7540
H. Fujie, H. Otsubo, R. Nomura, T. Hirano, D. Katakai, and K. Shino
a Biomechanics Laboratory, Kogakuin Univ., Tokyo, Japan; b Dept. of Orthopaedic Surgery, Osaka Univ. Medical School, Osaka, Japan

09:15-09:30  In vivo measurement of graft tension in twin-tunnel/two-bundle ACL reconstruction #6250
Tatsuo Mae, Konsei Shino, Norinao Matsumoto, Ken Nakata, Shuji Horibe; Dept. of Sports Medicine, Osaka Kousei-Nenkin Hospital, Osaka, Japan; b Faculty of Comprehensive Rehabilitation, Osaka Prefecture Univ., Habikino, Japan; Dept. of Orthopaedics, Osaka Univ., Suita, Japan; Dept. of Sports Orthopaedic, Osaka Rousai Hospital, Sakai, Japan

09:30-09:45  Kinematic analysis of the influence of the lateral plasty during ACL reconstruction #5911
Simone Bignozzi, Stefano Zaffagnini, Sandra Martelli, Nicola Lopomo Rizzoli Institutes, Lab. Biomeccanica, Bologna, Italy

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track

3.1 Joints- 3.1.1.1 Hip
**Session Organizers /Chair:** Marco Viceconti, Georg Duda  
**Monday, July 31**  
**Room R1.046**

**08:15-08:30**  
**Finite Element Analysis of Contact and Interfacial Stresses in Artificial Hip Joint #4330**  
Mamata Kumari Paddy, B. Pradhan, S.K. Roy Chowdhury  
*a* Orissa Engineering College, Bhubaneswar, India; *b* Mech. Eng. Dept., IIT, Kharagpur, India

**08:30-08:45**  
**Hip Abductor Function after Total Hip Replacement: A Comparison of the Anterior and Lateral Approaches #4301**  
Virginia M. Klausmeier, Li-Shan Chou, Whitney Gum, Brian Jewett, Dennis Collis  
*a* Dept. of Human Physiology, Univ. of Oregon, Eugene, OR, U.S.A  
*b* Orthopedic Healthcare Northwest, Eugene, OR, U.S.A

**08:45-09:00**  
**Comparative Study of Probabilistic Methods applied to a 3D Finite Element Model of a THR #5830**  
Loujaine Mehrez, Andrew New, Mamadou T Bah, Martin Browne; Bioengineering Sciences Research Group, School of Engineering Sciences, Univ. of Southampton

**09:00-09:15**  
**The effect of muscle loads on the interface micromotion of hip stems #5601**  
Mohammed R. Abdul Kadir, Ulrich N. Hansen, Andrew A. Amis, Ralf Klabunde  
*a* Dept. of Mechanical Engineering, Imperial College London, UK; *b* Biomechanics Laboratory, Universiti Teknologi Malaysia, Malaysia; *c* Zimmer European Headquarters, Winterthur, Switzerland

**09:15-09:30**  
**Hip Joint Centre Position Estimation for Clinical Gait Analysis #5461**  
Z. Yuan, M.E. Harrington, A.B. Zavatsky; *a* Dept. of Engineering Science, Univ. of Oxford, Oxford, UK; *b* Oxford Gait Laboratory, Nuffield Orthopaedic Centre NHS Trust, Oxford, UK

**09:30-09:45**  
**Optimisation of the Stress Distribution in Ceramic Hip Joint Balls by Implementation of Biological Growth #7394**  
Ch. Affolter, B. Weisse, A. Stutz, S. Köbel; *a* Swiss Federal Laboratories for Materials Testing and Research (EMPA), Laboratory for Materials and Engineering, Duebendorf, Switzerland; *b* METOXIT AG, Thayngen, Switzerland

**09:45-10:00**  
**Assessment of the implant-bone interface in 38 post mortem retrieved femoral components #6916**  
Bishop NE, Klein A, Schönwald M, Hahn M, Püschel K, Morlock MM  
*a* Biomechanics Section, TU Hamburg-Harburg, Hamburg, Germany; *b* Institute for Legal Medicine, Univ. Hospital Eppendorf, Hamburg, Germany

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**3. Musculoskeletal systems and Performance-Joint ISB/ESB Track**

**3.1.4.1 Upper Extremity**

**Session Organizers:** Franz van der Helm, C. Disselhorst-Klug  
**Monday, July 31**  
**Room R2.091**

**08:15-08:30**  
**Three-Dimensional Shoulder Kinematics by Optoelectronic Stereophotogrammetry #5669**  
Patrick Salvia, Stéphane Bouillard, Rémi Moletta, Victor Sholukha, Serge Van Sint Jan and Marcel Rooze; *a* Laboratoire d’Anatomie, Faculté de Médecine, Université Libre de Bruxelles, Bruxelles, Belgique; *b* Fondation Hopale - Centre Calvé - Berek sur mer, France; *c* Dept. of Applied Mathematics, Polytechnical Univ., Saint Petersburg, Russia

**08:30-08:45**  
**Arm Strength During One-Handed Pushing And Its Relationship To Shoulder Geometry #4880**  
Krystyna Gielo-Perczak, Simon Matz, Kai-Nan An; *a* Liberty Mutual Research Institute for Safety, Hopkinton, MA, USA; *b* Mayo Clinic Rochester, MN, USA

**08:45-09:00**  
**Evaluation of a 3D object registration method for analysis of humeral kinematics #4598**  
Eugenij Bobrowsitch, Carl Imhauser, Heiko Graichen, Lutz Dürsel; *a* Institute of Orthopaedic Research and Biomechanics, Univ. of Ulm, Germany; *b* Orthopaedic Dept., Univ. of Frankfurt, Germany; *c* Asklepios Orthopädische Klinik Lindenlohe, Schwandorf, Germany
09:00-09:15 In-vivo evaluation of upper arm soft tissue artefact during elevation in the scapular plane
#4570
Evgenij Bobrowitsch a, Henrich Mannel a, Frédéric Marin b, Heiko Graichen b, Lutz Düerselen a
a Institute of Orthopaedic Research and Biomechanics, Univ. of Ulm, Germany; b Orthopaedic
Dept., Univ. of Frankfurt, Germany

09:15-09:30 A numerical tool for the reconstruction of the physiological kinematics of the
glenohumeral joint (GHJ) #5720
HO Amadi a,b, AMJ Bull a, UN Hansen b; Depts. of Bioengineering a and Mechanical
Engineering b, Imperial College London, United Kingdom

4. Implants for Trauma and Orthopedics-Joint ESB Track
Track Coordinators: Erwin Steinhauser, Cheng Kung Cheng

4.1 Biomechanical Analysis of Retrieval Implants
Session Organizers: Michael Morlock, Luca Cristofolini
Chair: Luca Cristofolini

Monday, July 31
Room E 1.03

08:15-08:30 Joint Replacement Design Guided by Clinical Retrievals #6165
Melinda Harman a, Scott Banks b, W. Andrew Hodge c; a Orthopaedic Research Laboratory, The BioMotion Foundation, West Palm Beach, Florida USA; b Dept. of Mechanical & Aerospace Engineering, Univ. of Florida, Gainesville, Florida USA

08:30-08:45 Pictorial information of TKA wear scars provides information beyond the intrinsic geometrical factors #6958
Diego A. Orozco, Markus A. Wimmer; Rush Univ. Medical Center, Chicago (IL), USA

08:45-09:00 Wear Pattern Analysis of Tibial Polyethylene Inserts from Failed Total Knee Arthroplasty—A Comparison of Mobile-Bearing and Fixed-Bearing Knees #7210
Fang-Yuan Ho a; Hon-Ming Ma b, Jian-Jong Liao a, Ting-Kuo Chang a, d; Chuan-Ren Yeh a; Chun-Hsiung Huang a,d

09:00-09:15 In-vitro versus in-vivo analysis of metal-on-metal articulations #7892
C.B. Rieker, R. Schön, P. Köttig, M. Shen, J. Krevolin; Zimmer Switzerland

09:15-09:30 In-vivo wear of hip surface replacements - a comparison of retrievals and simulator results #5041
Morlock, M a, Delling, G b, Rüther, W b, Hahn, M b, Bishop, N c; a Biomechanics Section, Hamburg Univ. of Technology, Hamburg, Germany; b Univ. Hospital Eppendorf, Hamburg, Germany

09:30-09:45 Accurate measurement of low wear volumes in total hip arthroplasty #7360
A. Becker, Y. Dirix, H. Schmotzer; Plus orthopedics, Aarau, Switzerland

5. Occupational and Impact Injury Biomechanics
Track Coordinators: Heiner Bubb, Narayan Yoganandan
Impact Biomechanics Coordinators: Narayan Yoganandan, Brian Stemper

5.1 Real World Injuries
Monday, July 31
Session Organizer /Chair: Frank A. Pintar
Room R0.058

08:15-08:30 A New Protocol for Documenting the Causes and Biomechanics of Injury in Crashes #7271
Jonathan D. Rupp, Lawrence W. Schneider, Joel D. MacWilliams, and the Members of the CIREN Engineering Committee; Univ. of Michigan Transportation Research Institute, Ann Arbor, MI, USA

08:30-08:45 Non-Ankle Lower Extremity Injury Distribution in NASS and CIREN Frontal Crashes #6018
Rodney W. Rudd a, Refaat Hanna b, Christopher Sherwood a, Christine Burke b, Samir M. Fakhry b, c; a Univ. of Virginia Center for Applied Biomechanics, Charlottesville, VA b Honda Inova Fairfax Hospital CIREN Center, Falls Church, VA
08:45-09:00  Lower Extremity Injuries in Children Seated in Forward Facing Child Restraint Systems #5129
Jessica S. Jermakian and Kristy B. Arbogast; Center for Injury Research and Prevention, The Children’s Hospital of Philadelphia, Philadelphia, USA

09:00-09:15  The Incidence of Upper and Lower Extremity Injuries from Far Side Crashes #5914
H. Clay Gabler a, Brian Fildes b, Michael Fitzharris c, and Kennerly Digges c
a Virginia Tech, Blacksburg, Virginia, USA; b Monash Univ. Accident Research Centre, Melbourne, Australia; c George Washington Univ., Ashburn, Virginia, USA

09:15-09:30  Characterizing Occupant Injuries in Vehicle Crashes with a Deployed Side Airbag #6641
Frank A. Pintar, Narayan Yoganandan; Medical College of Wisconsin and VA Medical Center, Neuroscience and Biomechanics Research Laboratories, Milwaukee, WI, USA

09:30-09:45  Predictors of Traumatic Rupture of the Aorta in Near-Side Impacts #7049
John M. Cavanaugh a, Jeffrey Augustin b, James Stratton b, Jeff Mackinnon b, Luis Labist e, Elana Perdeck b; a Wayne State Univ., Bioengineering Center, Detroit, USA; b Univ. of Miami, Ryder Trauma Center, Miami, USA

5. Occupational and Impact Injury Biomechanics

Occupational Biomechanics Coordinator: Heiner Bubb

5.10.1 Ergonomics
Session Organizers /Chairs: Heiner Bubb, M. Xuguang Wang
Monday, July 31
Room R0.003

08:15-08:45  Automobile seat comfort elements: Physiological demands, customer requests and realization possibilities #6046
Jan P. Petzel, Susanne Frohriep; Leggett and Platt Automotive Group, Nuremberg, Germany

08:45-09:00  Continuous motion as strategy of the driver to avoid static spinal loading #4038
Steffen Adler a, Reinhard Blickhan a, Arnd Friedrichs b; a Chair of Motion Science, Institute of Sports Science, Friedrich-Schiller-Univ., Jena, Germany; b LWS Risk Management Consult GmbH, Brannenburg, Germany

09:00-09:15  Withdrawn

09:15-09:30  An exploratory investigation of the discomfort of clutch pedal operation using a musculoskeletal biomechanical model #4836
François Fraysse, Xuguang Wang, Laurence Chèze ; LBMH, INRETS-UCBL, Lyon, France

6. Sport Biomechanics-Joint ISB Track

Track Coordinators: Andreas Imhoff, Benno M. Nigg, Erich Müller
6.1 Sport Injuries- 6.1.1.1 Mechanics/Training
Session Organizers /Chairs: Peter Brüggemann, Joe Hamil
Monday, July 31
Room D2.12

08:15-08:45  Can We Learn More From Prospective or Retrospective Studies? #5321
Joseph Hamill a and Irene Davis b; a Univ. of Massachusetts, Amherst, USA, b Univ. of Delaware, Ohio, USA

08:45-09:00  Angular impulse and patellofemoral pain in runners #6624
Darren J. Stefanyshyn; Human Performance Laboratory, Univ. of Calgary, Calgary, Canada

09:00-09:15  Pattern recognition of ITB overuse injuries in running #4630
Stefan Grau , Christian Maiwald , Inga Krauss , Marlene Mauch, Thomas Horstmann Univ. Clinics Tübingen, Dept. of Sports Medicine, Tübingen, Germany

09:15-09:30  Effect of chronic endurance running on muscle capacities and safety of the musculoskeletal system during walking and running #7742
Kiros Karamanidis, Adamantios Arampatzis; Institute for Biomechanics and Orthopaedics, German Sport Univ. of Cologne, Germany

09:30-09:45  Gender specific differences in running mechanics #7748
W. Potthast, I. Wisemann, A. Höhne and G.-P. Brüggemann; German Sport Univ. Cologne, Institute of Biomechanics and Orthopaedics, Cologne, Germany
6. Sport Biomechanics-Joint ISB Track
6.9.1 Sport Analysis
Session Organizer /Chair: Tzyy-Yuang Shiang
Monday, July 31
Room R1.003

08:15-08:45 Performance Factors In Ski Jumping #7642
Wolfram Müller, Institute of Biophysics, Human Performance Research Center, Karl-Franzens and Medical Univ. of Graz, Austria

08:45-09:00 Gait Stability Following Concussion #4299
Li-Shan Chou, Tonya M. Parker, Robert Catena and Louis R. Osternig, Motion Analysis Laboratory, Dept. of Human Physiology, Univ. of Oregon, Eugene, OR, USA

09:00-09:15 The energy stored in the muscles during maximal Counter Movement Jump in the aged #4941
Yu Liu, I-Fang Lee, Jia-Yean Chen; Dept. of Sport Science, Shanghai Univ. of Sport, Shanghai, China; Dept. of Physical Education, Chinese Culture Univ., Taipei, Taiwan

09:15-09:30 Dynamic Analysis of the Lower Extremities During Elliptical Exercise #4167
Tung-Wu Lu and Hui-Lien Chien; Institute of Biomedical Engineering, National Taiwan Univ., Taipei, Taiwan

09:30-09:45 Place Of The Force And Emg Peak In Different Cadences In The Cycling #7036
Everton Rocha, Artur Bonezi, Dimitri Molenda, Débora Cantergi, Denise Soares, Cláudia Candotti e Jefferson Loss, Exercise Research Laboratory, Federal Univ. of Rio Grande Sul, Porto Alegre, Brazil

10. Cellular and Molecular Mechanics
* Including presentations from Thread 3 Biomechanics at Micro- and Nanoscale Levels
Track Coordinators: Roger Kamm, Hiroshi Wada
10.1.1 Cell Mechanics: Biomechanics at Micro- and Nanoscale Levels
Session Organizers: Kazuo Tanishita, Ed Guo
Monday, July 31
Room R0.056

08:15-08:30 Characterizing formin: a step-by-step approach #5430
Brian Gentry, Josef Käs; Dept. of Soft Matter Physics, Universität Leipzig, Leipzig, Germany

08:30-08:45 Development of a novel flat punch indentation technique for probing meso-scale mechanical response of soft matter with atomic force microscopy #7537

08:45-09:00 Topological characterization by atomic force microscopy of prestin-transfected CHO cell membrane #4652
Hiroshi Wada, Michio Murakoshi, Takashi Gomi; Dept. of Bioengineering and Robotics, Tohoku Univ., Sendai, Japan

09:00-09:15 Intracellular Measurements of Strain Transfer using Texture Correlation #5764
Christopher L. Gilchrist, Sietske W. Witvoet-Braam, Farshid Guilak, and Lori A. Setton
a Dept. Biomedical Engineering and Surgery, Duke Univ., North Carolina, USA
b Dept. Biomedical Engineering, Eindhoven Univ. of Technology, Eindhoven, The Netherlands

14. Cardiovascular Mechanics
14.1.1 Aneurysms
Session Organizers /Chairs: Tim McGloughlin, Ender A. Finol
Monday, July 31
Room G0.01

08:15-08:45 Keynote: Analysis of the importance of the ratio of aneurysm size to parent artery diameter on hemodynamic conditions # 7584
Hasballah Zakaria, Howard Yonas, Anne M. Robertson; Dept. of Mechanical Engineering, Univ. of Pittsburgh, Pittsburgh, PA, USA; Dept. of Surgery, School of Medicine, Univ. of New Mexico, Albuquerque, NM, USA

08:45-09:00 Mechanical Stress In Abdominal Aneurysm: Influence Of Geometry And Material Anisotropy #6660
José F. Rodríguez, Cristina Ruiz, Gerard Holzapfel, Manuel Doblaré
Group of structural mechanics and material modelling (GEMM), Aragon Institute of Engineering Research (I3A), Univ. of Zaragoza, Spain; Institute of Structural Analysis-Computational Biomechanics, Graz Univ. of Technology, Austria

09:00-09:15 A computational parametric study on the permeability of intra-luminal thrombus and aortic wall within abdominal aortic aneurysms #6022
Jonathan P Vande Geest, Bruce R Simon, Ariane Mortasavi; Dept. of Aerospace and Mechanical Engineering, Univ. of Arizona, Tucson, AZ, USA

09:15-09:30 Transient Blood Flow – Wall Interaction in Abdominal Aortic Aneurysms #7193
Christine M. Scotti, Ender A. Finola, Biomedical Engineering Dept., Carnegie Mellon Univ., Pittsburgh, USA; Institute for Complex Engineered Systems, Carnegie Mellon Univ., Pittsburgh, USA

09:30-09:45 Proper analysis of finite element results for predicting abdominal aortic aneurysm rupture #5887
Steven P. Marra, Jeffrey M. Dwyer, Mark F. Fillinger, David T. Chen, M. Weston Chapman, Daniel S. Hassoun, Francis E. Kennedy; Thayer School of Engineering, Dartmouth College, Hanover, New Hampshire, United States; Section of Vascular Surgery, Dartmouth-Hitchcock Medical Center, Lebanon, New Hampshire, United States; MMS, West Lebanon, New Hampshire, United States

14. Cardiovascular Mechanics
14.13.1 Vascular Wall Mechanics-Biomechanical analysis from systemic to organ level
Session Organizers /Chairs: Gerhard Holzapfel, Takeo Matsumoto
Monday, July 31
Room G1.27

08:15-08:45 Keynote: The role of structural and functional asymmetry in the circulation #7612
Thomas Kenner; Medizinische Universität Graz, Physiologisches Institut, Graz, Austria

08:45-09:00 Pulsatile flow in carotid artery bifurcation #6196
Ruchi Agarwal, V.K. Katiyar & Prabhakar Pradhan
Dept. of Mathematics, IIT, Roorkee; Dept. of Mathematics, G.K. Univ., aridvar, India

09:00-09:15 Normalizing the Langewouters pressure-area relationship: a novel geometry-independent description of large artery stiffness? #7338
S.J. Vermeersch, E. Rietzschel, M. De Buyzere, L. Van Bortel, G. De Backer, T.C. Gillebert, P.R. Verdonck, P. Segers
Cardiovascular Mechanics and Biofluid Dynamics research unit, Institute Biomedical Technology, Ghent Univ., Belgium; Ghent Univ. Hospital, Depts. Cardiovascular Diseases, Public Health, Heymans Institute of Pharmacology, Ghent Univ., Belgium

09:15-09:30 Response of human arteries to stress and temperature #7118
J.M. Atienza, F.J. Rojo, G.V. Guinea, R.J. Burgos, P. Aragoncillo, K. Hayashi, M. Elices; Departamento Ciencia de Materiales, Universidad Politécnica de Madrid, Madrid, Spain; Hospital Puerta de Hierro, Madrid, Spain; Hospital Clinico San Carlos, Madrid, Spain; Okayama Univ. of Science, Okayama, Japan

09:30-09:45 A 3-D model for the biomechanical properties of venous wall #4968
R. Rezakhaniha and N. Stergiopulos; Ecole Polytechnique Fédérale de Lausanne (EPFL) Hemodynamics and Cardiovascular Technology Laboratory (LHTC), Lausanne, Switzerland

16. Reproductive Biomechanics
Track Coordinators: David Elad, Roger C Young
16.1 Non-Pregnant Uterine Peristalsis
Session Organizers /Chairs: Osnat Eytan, Ludwig Wildt
Monday, July 31
Room R0.006
08:15-08:45  Keynote: Transport phenomena in human female genital tract #7827
Ludwig Wildt¹, Dijana Hadziomerovic², Helmut W. Ott³, Dirk W. Heute⁴, Irene Virgolini⁵
¹Dept. of Gynecologic Endocrinology and Reproductive Medicine; ²Dept. of Nuclear Medicine; Medical Univ. of Innsbruck, Innsbruck, Austria

08:45-09:00  Simulations of embryo transfer procedures with a laboratory uterine model #6391
Osnat Eytan¹, Uri Zaretsky¹, Ariel J. Jaffa¹, David Elad²
¹Lis Maternity Hospital, Tel Aviv Medical Center, Tel Aviv, Israel; ²Dept. of Biomedical Engineering, Tel Aviv Univ., Tel Aviv, Israel

09:00-09:15  Utero–tube transport disorder in adenomyosis and endometriosis – a cause for infertility #6877
S. Kissler¹, N. Hamscho², S. Zangos³, I. Wiegratz³, N. Doebert³, F. Gruenwald³, T.J. Vogl³, E. Siebzehnruebl³, M. Kaufmann³

09:15-09:30  Uterine contractility: Visualization of synchronization measures in two simultaneously recorded signals #4752
Edward Oczeretko¹, Marta Borowska¹, Agnieszka Kitlas¹, Jolanta Swiatecka¹, Tadeusz Laudanski¹, Institute of Computer Science, Univ. of Bialystok, Bialystok, Poland; ¹Dept. of Gynecology, Medical Univ. of Bialystok, Bialystok, Poland; ¹Dept. of Pathophysiology of Pregnancy, Medical Univ. of Bialystok, Bialystok, Poland

09:30-09:45  Uterine contractility evaluated on Cine MRI #6783
Kaori Togashi, Takashi Koyama; Dept. of Diagnostic Imaging and Nuclear Medicine, Graduate School of Medicine, Kyoto Univ., Kyoto, Japan

17. Biomechanics in Nature
Track Coordinators: Tim Pedley, Johan van Leeuwen

17.1 Bionics
Session Organizers: Julian Vincent, Cam Tropea
Monday, July 31
Room R1.087

08:15-08:45  Keynote: Technology trajectories, innovation and the growth of biomimetics #4425
Richard H.C. Bonser¹, Julian F.V. Vincent²; ¹Centre for Biomimetics, Univ. of Reading, Reading, UK; ²Centre for Biomimetic and Natural Technologies, Univ. of Bath, Bath, UK

08:45-09:00  Mechanical Design after Nature #7117
Claus Mattheck, Roland Kappel; Institute for Materials Research II, Forschungszentrum Karlsruhe, Karlsruhe, Germany

09:00-09:15  The skin of plants: multifunctional interface and inspiration for biomimetic engineering #6295
Per Löthman & Christoph Neinhuis; Institut für Botanik, TU Dresden, Dresden, Germany

09:15-09:30  Unfolding of Petunia Flower from Mechanical Viewpoint #7299
Hidetoshi KOBAYASHI, Keitaro HORIKAWA and Rie ASAHI; ¹Dept. of Mechanical Science and Bioengineering, Graduate School of Engineering Science, Osaka Univ., Toyonaka, Japan

09:30-09:45  Influence of surface energy and roughness on adhesion of the beetle Gastrophysa viridula #7126
Naoe Hosoda¹ and Stanislav Gorb²; ¹National Institute for Materials Science, Tsukuba, Japan; ²Max Planck Institute for Metal Research, Stuttgart, Germany

18. Trends in Cranial and Spinal Biomechanics
Track Coordinators: Hiroshi Ujiie, Hans-Jakob Steiger

18.1.1. Flow in cerebral aneurysms
Session Organizers /Chairs: B. Lieber, Hiroshi Ujiie
Monday, July 31
Room R2.007

08:15–08:45  Keynote: Flow-related aspects of cerebral aneurysms #6709
Daniel A Rufener¹, Nikos Stergiopoulos¹, Bastien Chopard¹, Alejandro Frangi¹, Rod Hose¹, Juan R Cebal¹, Pedro Lylky¹; ¹Neuroradiology, Univ. Hospital of Geneva, Switzerland; ²Lab. of Hemodynamics and Cardiovascular Technology, Swiss Fed. Inst. of Tech., Lausanne, Switzerland; ³CUI, Univ. of Geneva, Switzerland; ⁴Computational Imaging
08:45-09:00  **Neurosurgery and Biomechanics of Cerebral Aneurysms #7267**  
Andreas Spuler², Leonid Goubergrits³, Ulrich Kertzscher², Jürgen Kiwit³, Klaus Affeldb  
²Dept. of Neurosurgery, Helios Klinikum Berlin-Buch, Berlin, Germany; ³Biofluidmechanics Laboratory, Universitätmedizin Berlin, Berlin, Germany  

09:00-09:15  **The mechanism of rupture of intracranial aneurysm #6198**  
Hiroshi Ujiie, Yoshiaki Suzuki, Noriyoshi Takahashi, Makoto Kaibara, Katoh Koichi, and Tomokatsu Hori; Dept. of Neurosurgery, Neurological Institute, Tokyo Women’s Medical Univ., Tokyo, Japan; Beam application team, Biopolymer Physics Laboratory, the Institute of Physical and Chemical Research, Wako, Japan  

09:15-09:30  **Management of Flow in Cerebral Aneurysms #4610**  
Baruch Barry Lieber; Dept. of Biomedical Engineering and of Radiology, Univ. of Miami, USA  

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20. **Biomechanics of Organs**  
**Track Coordinators:** Mark Johnson, Rich Hart  
**20.1.1 Biomechanics and Cell and Tissue Engineering of the Posterior Segment**  
**Session Organizers:** J. Crawford Downs, Rich Hart  
**Chair:** J. Crawford Downs  
**Monday, July 31**  
**Room R1.008**  

08:15-08:30  **Computer model of the human eye #7358**  
Terry Beresford-West a, Philippe Young b, Simpleware Ltd, Innovation Centre, Exeter, UK; b School of Engineering and Computer Science, Univ. of Exeter, Exeter, UK  

08:30-08:45  **Influence of cyclical mechanical strain on extracellular matrix gene expression in human lamina cribrosa cells in vitro #6327**  
O’Brien CJ a, Kirwan RP a, Fenerty CH a, Crean J a, Wordinger R a, Clark AF d; a Ophthalmology, Mater Dublin, Dublin, Ireland; b Conway Institute, UCD, Dublin, Ireland; c Cell Biology and Genetics, Univ. of North Texas Health Center at Fort Worth, Fort Worth, USA; d Glaucoma Research, Alcon Research Labs, Fort Worth, USA  

08:45-09:00  **In-Plane Mechanics of the Optic Nerve Head with Cellular Solids Models #6025**  
E.A. Sander a,b, J.C. Downs c, R.T. Hart b, C.F. Burgoyne a, E.A. Nauman a; a Mechanical Engineering, Purdue Univ., West Lafayette, IN, USA; b Biomedical Engineering, Tulane Univ., New Orleans, LA, USA; c Devers Eye Institute, Portland, Oregon, USA  

09:00-09:15  **Predicted deformation of individual-specific optic nerve head models #6096**  
I.A. Sigala a, J.G. Flanagan a,b, C.R. Etherie a,b,c; a Mechanical Engineering, Univ. of Toronto, Toronto, Canada; b Dept. of Ophthalmology and Vision Sciences, Univ. of Toronto, Toronto, Canada; c School of Optometry, Univ. of Waterloo, Waterloo, Canada; d Biomedical Engineering, Univ. of Toronto, Toronto, Canada  

09:15-09:30  **Continuum-Level Finite Element Modeling of the Optic Nerve Head #7263**  
Michael D. Roberts a, Richard T. Hart b, Claude F. Burgoyne a, J.Crawford Downing a; a Discoveries in Sight, Devers Eye Institute, Portland, OR, USA; b Dept. of Biomedical Engineering, Tulane Univ., New Orleans, LA, USA  

09:30-09:45  **Finite Element Sub-Structuring Method for Analysis of the Optic Nerve Head (ONH) #6357**  
R.T. Hart a, M.D. Roberts b, C.F. Burgoyne b, J.C. Downs b; a Dept. of Biomedical Engineering, Tulane Univ., New Orleans, LA, USA; b Devers Eye Institute, Portland, Oregon, USA  

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**Thread 1: Computational Methods in Biomechanics and Mechanobiology**  
**Thread organizers:** Gerhard A. Holzapfel, Tim David  
**T1.1.1 Computational Modelling and Mechanobiology of Cells**  
**Session Organizers /Chairs:** Gerhard A. Holzapfel, Dimitrije Stamenovic  
**Monday, July 31**  
**Room R1.006**
08:15-08:45  Keynote Modelling cell behaviour in compliant environments #5546
Ulrich S. Schwarz a, Ilka B. Bischofs b
a Heidelberg Univ., Center for Modelling and Simulation in the Biosciences, Heidelberg, Germany; b Dept. of Bioengineering, Univ. of California at Berkeley, Berkeley, CA, USA

08:45-09:00  Cell shape on micro-patterned adhesive substrates #5946
Ilka B. Bischofs a, Dirk Lehnert b, Franziska Klein b, Martin Bastmeyer b, Ulrich S. Schwarz a
a Dept. of Bioengineering, Univ. of California at Berkeley, CA, USA; b Karlsruhe Univ., Institute of Zoology I, Karlsruhe, Germany; c Heidelberg Univ., Center for Modelling and Simulation in the Biosciences, INF 293, Heidelberg, Germany

09:00-09:15  A continuum finite element model predicting cell motility #5779
B. Flaherty a, b, J.P. McGarry b, B.P. Murphy b, P.E. McHugh a, b; Dept. of Mechanical and Biomedical Engineering, National Univ. of Ireland, Galway, Ireland; a National Centre of Biomedical Engineering Science, National Univ. of Ireland, Galway, Ireland

09:15-09:30  A new computational approach to obtaining substrate displacement filed for determining cell traction forces #4903
Jeen-Shang Lin, Zhaochun Yang, James H-C. Wang; MechanoBiology Laboratory, Depts. of Orthopaedic Surgery, and Civil and Environmental Engineering, Univ. of Pittsburgh, USA

09:30-09:45  A mathematical model for analysis of retarded diffusion and receptor binding of lipid anchored ligands in the cell-bilayer contact area #5215
Jianhua Wu a, Ying Fang a and Cheng Zhu b; a School of Life Sciences, Sun Yat-Sen Univ., Guangzhou, China; b Dept. of Biomedical Engineering, Georgia Institute of Technology, Atlanta, USA

Thread 1: Computational Methods in Biomechanics and Mechanobiology

T1.15.1 Particle Tracking and Particle Methods for Biological Flows
Session Organizer: Timothy David
Monday, July 31
Room R1.002

08:15-08:30  Modelling particle deposition in a turbulent airway model # 5838
MAI Khan a, X Y Luo a and F C G A Nicolle b; a Dept. of Mathematics, Univ. of Glasgow, Glasgow, UK; b Dept. of Mechanical Engineering, Univ. of Sheffield, Sheffield, UK

08:30-08:45  Lattice-Boltzmann calculations of blood flow in a fluidised bed: results for the permeability and drag #6497
Andreas K. M. Podias, Yannis F. Missirlis; Biomedical Engineering Laboratory, Mechanical Engineering and Aeronautics Dept., Univ. of Patras, Rion-Patras, Greece

08:45-09:00  Particle Simulations of Blood Flow in Vein with Many Red Blood Cells #5071
Katsuya NAGAYANA; Dept. of Mechanical Information Science & Technology; Kyushu Institute of Technology, Iizuka, Japan

09:00-09:15  Three-Dimensional Simulations of Microscopic Blood Flow Using SPH Method #6576
Nobuatsu Tanaka, Yuiro Hayakawa And Toru Masuzawa; Dept. Of Mechanical Engineering, Ibaraki Univ., Hitachi, Japan

09:15-09:30  Simulation Study on Effects of Elastic Red Blood Cells on Primary Thrombogenesis using Particle Method #6790
Ken-ichi Tsubota, Hiroki Kamada, Shigeo Wada and Takami Yamaguchi; Dept. of Bioengineering and Robotics, Graduate School of Engineering, Tohoku Univ., Sendai, Japan

09:30-09:45  Fractals models for human body systems simulation #7231
Adriana Comanescu a, Dinu Comanescu b, Andreea Neagoe c, a Chair of Theory of Mechanisms and Robots, Univ. POLITEHNICA, Bucharest, Romania; b Chair of Fine Mechanics and Mechatronics, Univ. POLITEHNICA, Bucharest, Romania; c Grigore Alexandrescu Children’s Urgency Hospital, Bucharest, Romania

Plenary Lecture
Monday, July 31
10:00-10:30
1. Bone Mechanics – Joint ESB Track

1.1.2 Advanced Detection of Bone Quality

Session Organizers /Chairs: Bert van Rietbergen, J. A. MacNeil

Monday, July 31
Room R0.055

11:00-11:15 Cervical hip fractures predominate at low fracture loads #6541
Pasi Pulkkinen\textsuperscript{a}, Felix Eckstein\textsuperscript{b,c}, Eva-Maria Lochmüller\textsuperscript{d}, Volker Kuhn\textsuperscript{a}, Timo Jämsä\textsuperscript{a}
\textsuperscript{a}Dept. of Medical Technology, Univ. of Oulu, Oulu, Finland; \textsuperscript{b}Ludwig-Maximilians-Universität, München, Germany; \textsuperscript{c}Paracelsus Medical Private Univ., Salzburg, Austria; \textsuperscript{d}Medical Univ., Innsbruck, Austria

11:15-11:30 Differences in radius strength between male elite rock climbers and runners determined by FE analysis of bone in-vivo #4592
J. Kunec\textsuperscript{a,b}, W. Kemmler\textsuperscript{c}, S. von Stengel\textsuperscript{b}, K. Engelke\textsuperscript{c}, B. van Rietbergen\textsuperscript{a}; \textsuperscript{a}Eindhoven Univ. of Technology, Eindhoven, The Netherlands; \textsuperscript{b}Czech Academy of Sciences, Prague, Czech Republic; \textsuperscript{c}Univ. of Erlangen-Nürnberg, Germany

11:30-11:45 The Influence of CT Parameters on Hounsfield Units in Cortical Bone #4756
Sune Pettersen\textsuperscript{a,b}, Liv Nesje\textsuperscript{c}, Bjørn Skallerd\textsuperscript{d}
\textsuperscript{a}Dept. of Structural Engineering, Faculty of Engineering Science and Technology, Norwegian Univ. of Science and Technology, Trondheim, Norway; \textsuperscript{b}Norwegian Orthopaedic Implant Research Unit, St.Olavs Hospital, Trondheim, Norway; \textsuperscript{c}Dept. of Radiotherapy, St.Olavs Hospital, Trondheim, Norway

11:45-12:00 Multi-axial plastic strain rates in cellular bone based on a plastic potential #5532
Werner Winter, Institute of Applied Mechanics, Univ. of Erlangen-Nuremberg, Germany

12:00-12:15 Predicting the time evolution of the heterogeneous mineralization in trabecular bone #7328
Davide Ruffoni\textsuperscript{a}, Peter Fratzl\textsuperscript{b}, Paul Roschger\textsuperscript{b}, Klaus Klaushofer\textsuperscript{b}, Richard Weinkamer\textsuperscript{a}
\textsuperscript{a}Max Planck Institute of Colloids and Interfaces, Dept. of Biomaterials, Potsdam, Germany; \textsuperscript{b}Ludwig Boltzmann Institute of Osteology at the Hanusch Hospital of WGKK and AUVA Trauma Centre Meidling, 4th Med. Dept. Hanusch Hospital, Vienna, Austria

12:15-12:30 Prediction of biomechanical stability after callus distraction by high resolution scanning acoustic microscopy #5778
Kay Raum\textsuperscript{a}, Hermann Mayr\textsuperscript{b}, Werner Hein\textsuperscript{a}, Robert Hube\textsuperscript{a,b}, \textsuperscript{b}Q-BAM Group, Dept. of Orthopedics, Martin Luther Univ. of Halle-Wittenberg, Halle, Germany
\textsuperscript{b}OCM Clinic, Munich, Germany

2 Musculoskeletal Mechanics-Joint ISB Track

2.1.2 Cartilage Biomechanics (Articular Cartilage Properties)

Session Organizer: Van C. Mow

Monday, July 31
Room R1.049

11:00-11:15 Collagen network and fixed charge density of articular cartilage modulate time- and depth-dependent behavior of chondrocytes #4219
Rami K Korhonen\textsuperscript{a}, Petro Julkunen\textsuperscript{a}, Walter Herzog\textsuperscript{b}; \textsuperscript{a}Human Performance Laboratory, Faculty of Kinesiology, Univ. of Calgary, Calgary, Alberta, Canada; \textsuperscript{b}Dept. of Applied Physics, Univ. of Kuopio, Kuopio, Finland

11:15-11:30 Mechanoregulation of collagen orientation in articular cartilage #4421
Wouter Wilson\textsuperscript{a}, Niels J.B. Driessen\textsuperscript{b}, René C.C. van Donkelaar\textsuperscript{a}, Keita Ito\textsuperscript{a,b}
\textsuperscript{a}Dept. of Biomedical Engineering, Eindhoven Univ. of Technology, Eindhoven, The Netherlands; \textsuperscript{b}AO Research Institute, Davos, Switzerland.

11:30-11:45 Elastic Properties of Human Knee and Ankle Cartilage #4646
Salvatore Federico a, Victor Valderrabano b,a, Vibha Dhawan a, Sang-Kuy Han c,a, Walter Herzog a,c; a Human Performance Laboratory, The Univ. of Calgary, Canada; b Orthopaedic Univ. Clinic Basel, Switzerland; c Dept. of Mechanical and Manufacturing Engineering, The Univ. of Calgary, Canada

11:45-12:00 Determination of Elastic Properties of Articular Cartilage by Aspiration Test #5273
Makoto Sakamoto and Koichi Kobayashi; Dept. of Health Sciences, Niigata Univ. School of Medicine, Niigata, Japan

12:00-12:15 Comparison of finite element and experimental contact pressures in the human hip joint under physiological loading #5997
Andrew E. Anderson a, Benjamin J. Ellis a, Steve A. Maas b, Jeffrey A. Weiss a,b; a Dept. of Bioengineering & Scientific Computing and Imaging Institute, Univ. of Utah, Salt Lake City, Utah, USA; b Dept. of Orthopedics, Univ. of Utah, Salt Lake City, Utah, USA

12:15-12:30 Models of Cartilage Stress-Relaxation #6645
Ron June a,c, Amir Jamalia, Justin Barone b, David Fyhrie a,c; a Orthopaedic Research Laboratory, Univ. of California at Davis, Sacramento, USA; b USDA Agricultural Research Service, Beltsville, MD, USA; c Biomedical Engineering Graduate Group, Univ. of California at Davis, Sacramento, USA

2 Musculoskeletal Mechanics-Joint ISB Track
2.8.2 Substructural Mechanics
Session Organizers /Chairs: Savio L.Y. Woo, Richard E. Debski, Steve Abramowich
Monday, July 31
Room 1.004

11:00-11:15 Distribution, Fine Structure and Mechanical Role of Dermatan Sulfate Glycosaminoglycans in the Medial Collateral Ligament #6005
Clayton J. Underwood, Trevor J. Lujan, Heath B. Henninger, Brent M. Thompson, Jeffrey A. Weiss; Dept. of Bioengineering, Univ. of Utah, Salt Lake City, USA

11:15-11:30 Adaptation of mechanical, morphological and biochemical properties of the rat Achilles tendon to running, strength and vibration strength training #6262
Kirsten Legerlotz a, Peter Schjerling b, Henning Langberg c, Anja Niehoff a; a Institute of Biomechanics und Orthopaedics, DSHS-Cologne, Germany; b Dept. of Molecular Muscle Biology, Rigshospital, Copenhagen, Denmark; c Institute of Sports Medicine, Bispebjerg hospital, Copenhagen, Denmark

11:30-11:45 Tendon Micromechanics and its Implications in Mechanotransduction #5654
Masami Tamiwa, Hazel CR Screen, Julia C Shelton, Dan L. Bader; Dept. of Engineering, Queen Mary Univ. of London, UK

11:45-12:00 Role of P2Y1 and P2Y2 Purinoceptors in Determining Mechanosensitivity in Connective Tissue Cells #7879
a,b,c,eBanes, AJ a Fox, AM, Qi J, Jones B, Piascik, J, a,b, Thompson, JY, Koller, B; a Biomedical Engineering, b Curriculum of Applied Materials Science, School of Dentistry, c Genetics, Univ. of North Carolina, Chapel Hill, NC, USA; d Flexcell International Inc., Hillsborough, NC, USA; e NIEHS, Research Triangle Park, Raleigh, NC, USA

12:00-12:15 Nucleotides and Nucleosides Regulate Mechanical Integrity of Mouse Tail Tendons #7880
a Fox, AM, Piascik, J, a,b,c Thompson, JY, Koller, B, a,b,c,eBanes, AJ; a Biomedical Engineering, b Curriculum of Applied Materials Science, School of Dentistry, c Genetics, Univ. of North Carolina, Chapel Hill, NC, USA; d Flexcell International Inc., Hillsborough, NC, USA

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.1.1.2 Hip
Session Organizers /Chairs: Marco Viceconti, Georg Duda
Monday, July 31
Room R1.046

11:00-11:15 Influence of hip position on active and passive internal & external rotation #7240
Azadeh Shadmehr, Shohreh Jalalaei, Tahereh Ghavibonyeh; Dept. of Physical Therapy, Faculty of Rehabilitation, Tehran Univ. of Medical Sciences, Tehran, Iran
3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.1.4.2 Upper Extremity

Session Organizers: Franz van der Helm, C. Disselhorst-Klug
Monday, July 31
Room R2.091

11:15-11:30 Thumb joint coordination during opposition #5475
Zong-Ming Li, Jie Tang; Hand Research Laboratory, Dept. of Orthopaedic Surgery, Univ. of Pittsburgh, Pittsburgh, PA, USA

11:30-11:45 Three dimensional measurement of wrist movement: adaptation and calibration of the Fastrak® System #5207
Ian Scott, Arpit Jariwala, Lynda Cochrane, Graham Arnold, Carlos Wigderowitz, Rami Abboud; Institute of Motion Analysis and Research (IMAR), Univ. of Dundee, Scotland, UK. Institute of Biomedical Engineering, Univ. of Dundee, Scotland, UK.

11:45-12:00 Differences in the torque and force production during the shoulder external rotation in the transverse and sagittal planes #5111
Joelly Toledo, Roberto Krug, Marcelo Castro, Daniel Ribeiro, Jefferson Fagundes Loss;
Methodist Univ. Center IPA, Physiotherapy Course, Porto Alegre, Brazil; Rio Grande do Sul Federal Univ., Physical Education School, Porto Alegre, Brazil

4. Implants for Trauma and Orthopedics-Joint ESB Track
4.2.1 Hip Endoprosthetics – Surgical Aspects

Session Organizers /Chairs: Erwin Steinhauser, Melinda Harman
Monday, July 31
Room E1.03

11:00-11:15 Investigating the effect of surgical approach on the outcome of Total Hip Arthroplasty #5709
GM Whatling, CA Holt, L Jones, JK Madete, H Dabke, PM Alderman, P Roberts;
Cardiff School of Engineering, Cardiff Univ., Queen’s Buildings, Cardiff, UK; Royal Gwent Hospital, Cardiff Road, Newport, UK
11:15-11:30  Effect of cement pressurization on stem in-vitro stability with impaction allografting #6011
Carolyne Albertabc, Sanjeev Patil, Hanspeter Frei, Bas Masri, Clive Duncan, Thomas Oxlandabc, Göran Fernlundabc, Depts of *Materials Engineering, *Mechanical Engineering and *Orthopaedics, The Univ. of British Columbia, Vancouver, BC

11:30-11:45  Evolution of the residual stresses and temperature during polymerization of bone cement of an idealized hip implant: numerical results #7188
N. Nuñoa, M. A. Pérez, D. Plamondonb, A. Mądralee, J. M. García-Aznarb, M. Doblaréb a Département de génie de la production automatisée, École de technologie supérieure, Laboratoire de recherche en imagerie et orthopédie, Université du Québec, Montréal (Canada); bGroup of Structural Mechanics and Materials Modelling, Aragon Institute of Engineering Research (I3A), Univ. of Zaragoza, Zaragoza (Spain)

11:45-12:00  An intra-operative vibrational method for hip stem insertion endpoint detection and stability assessment - a pilot study #7447
Leonard C. Pastrava, Siegfried V. N. Jaceques, Michel Mulier, Georges Van der Perre a aDivision Biomechanics and Engineering Design, Katholieke Universiteit Leuven, Leuven, Belgium; bDept. of Orthopaedic Surgery, Univ. Hospital Leuven, Leuven, Belgium

12:00-12:15  Influence of residues between metal stem and femoral head on the static fracture load of ceramic implants #6993
Bernhard Weisse, Christian Affolter, Alex Stutz, Stefan Köbel, Wolfhart Rieger Laboratory for Materials and Engineering, Swiss Federal Laboratories for Material Testing and Research (EMPA), Dübendorf, Switzerland; b Metoxit AG, Thayngen, Switzerland

12:15-12:30  Load transfer to the femur by revision hip endoprostheses with distal interlocking option. An experimental analysis #5331
Martin Ellenriedera, Erwin Steinhauser, Wolfram Mittelmeier, Raymonde Busch, Reiner Gradinger a Klinik für Orthopaedie und Unfallchirurgie der TU Muenchen, Abt. Biomechanik, Munich, Germany; c Berufsgenossenschaftliche Unfallklinik Murnau, Murnau, Germany; d Orthopaedische Klinik und Poliklinik der Universitaet Rostock, Rostock, Germany; d Institut für Medizinische Statistik und Epidemiologie der TU Muenchen, Munich, Germany

5. Occupational and Impact Injury Biomechanics
5.2.1 Whiplash and Neck Injury Biomechanics
Session Organizers /Chairs: Brian Stemper, Beth Winkelstein
Monday, July 31
Room R0.058

11:00-11:15  The Biomechanical and Kinematic Differences Between Rear Impact and Frontal Impact Automobile Crashes at Low Velocities #4298
Arthur C. Croft; Spine Research Institute of San Diego; Southern California Univ. of Health Sciences

11:15-11:30  Comparison of ATD Upper and Lower Neck Flexion/Extension Moments, and Implications for Neck Injury Criteria #6151
Christine Raascha, Michael Carhart a, b Exponent Failure Analysis Associates, b Harrington Dept. of Bioengineering, Arizona State Univ.

11:30-11:45  Examining bumper cars as a surrogate for low-speed rear-end and frontal collisions #7416
Irving Schera, b Robert Cargilla, a Vinod Vijayakumara, Darrin Richards a, Michael Kuzela a Exponent, Inc., Los Angeles, CA, USA; b Musculoskeletal Biomechanics Research Laboratory, Univ. of Southern California, Los Angeles, CA, USA

11:45-12:00  Human Subjects Exposed to Very Low Velocity Frontal Collisions #4300
Arthur C. Croft; Spine Research Institute of San Diego; Southern California Univ. of Health Sciences, USA

12:00-12:15  Influences of added mass on neck injury risk during ejection gun phase while crewmembers wearing night vision goggles and counter weight #6374
Estelle Bernier-Chavary, a Sebastien. Laporte, Wafa. Skali, Anne Guillaumea a Institut de Médecine Aérospatiale du Service de Santé des Armées, Bréteigny sur Orge, France; b Laboratoire de Biomécanique, ENSAM CNRS UMR 8005, Paris, France
5. Occupational and Impact Injury Biomechanics
5.10.2 Ergonomics

Session Organizers /Chairs: Heiner Bubb, M. Xuguang Wang

Monday, July 31
Room R0.003

11:00-11:30  Keynote: Relaxation after isokinetic shoulder abductions in subjects with trapezius myalgia compared to controls #5949
Søgaard K, Andersen LL, Sjøgaard G.; National Institute of Occupational Health, Copenhagen, Denmark

11:30-11:45  Hand motion analysis during touch-typing using VICON system with finger force plate #5677
Naotaka Sakai, Satoshi Shimawaki; Biomechanics Laboratory, Utsunomiya Univ., Japan

11:45-12:00  Multi-digit maximum voluntary torque production on a circular object #6663
Jae Kun Shim a,b, Junfeng Huang c, Mark L. Latash d, Vladimir M. Zatsiorsky e
a Dept. of Kinesiology, Univ. of Maryland, College Park, MD, USA; b Bioengineering Program/Neuroscience and Cognitive Science Program, Univ. of Maryland, College Park, MD, USA; c Dept. of Kinesiology, Penn State Univ., Univ. Park, PA, USA

12:00-12:15  Maximum One-Handed Pull Force Under Constrained Conditions And Its Relation To Shoulder Geometry #5977
Krystyna Gielo-Perczak ; Liberty Mutual Research Institute for Safety, Hopkinton, MA, USA

12:15-12:30  Analysis of Leg Muscle Fatigue Using Electromyography – Insights into Chair Ergonomics #7643
Varadhan SKM and Venkatesh Balasubramanian; Rehabilitation Bioengineering Group, Dept. of Biotechnology, Madras, Chennai, India

6. Sport Biomechanics—Joint ISB Track
6.1.1.2 Mechanics/Training

Session Organizers: Peter Brüggemann, Steven Lorenz

Monday, July 31
Room D2.12

11:00-11:15  Decrease in eccentric hamstring strength among runners in the Tirol Speed Marathon #4608
Arnold Koller a, Gunther Sumann b, Wolfgang Schoberberger c, Helmut Hoertnagl d, Christian Haid e, aDept. of Sports Medicine, bUniv. Dept. of Anesthesiology and Critical Care Medicine, Medical Univ. of Innsbruck, Innsbruck, Austria; c The Research Dept. of Leisure, Travel and Alpine Medicine, The Univ. for Health Sciences, Medical Informatics and Technology, Hall, Austria; dUniv. Dept. of Orthopedics, Medical Univ. of Innsbruck, Innsbruck, Austria

11:15-11:30  The effects of muscle damage following eccentric exercise on gait biomechanics #5018
Giakas Giannis a, Paschalis Vassilios b, Koutedakis Yiannis c, Baltzopoulos Vassilios d, Jamurtas Athanasios e, Theoharis Vassilios f, Kotzamanidis Christos g

11:30-11:45  Effects of Muscle Strength Training with Whole Body Vibration Stimulation #5994
Xiaoyan Wei, Shanghai Univ. of Sports, Shanghai, China

11:45-12:00  Kinematic and electromyographic behaviour of injured and healthy ankles of basketball players during the jump to an unstable board #7483
M A Castro a, M A Janeiro b, O Fernando c, LM Cunha d; a ESTESC IPC; b FCDEF UP, c FMH UTL, dFC UP, Coimbra, Portugal

12:00-12:15  Prevention of ankle sprains in basketball – a prospective, randomized, biomechanical investigation #6626
Eric Eils, Marc Schröder, Ralf Schröter, Dieter Rosenbaum; Movement Analysis Lab, Orthopedic Dept., Univ. Clinics Muenster, Muenster, Germany

12:15-12:30  The Effect of Tibio-Talar Containment on Stability of the Ankle Joint #7616
Arno Frigg a, Victor Valderrabano b, Roman Frigg c, Beat Hintermann d, a Dept. of Orthopaedic Surgery, Univ. of Basel, Switzerland; b Human Performance Laboratory, Univ. of Calgary, Canada; c London School of Economics, London, United Kingdom

6. Sport Biomechanics—Joint ISB Track
6.9.2 Sport Analysis
Session Organizer: Tzyy-Yuang Shiang
Monday, July 31
Room R1.003

11:00-11:15 An Artificial Neural Network Method for Predicting Three-Dimensional Lower Limb Joint Moments During Vertical Jump From Measured Ground Reaction Forces #4681
Tung-Wu Lu, Szu-Min Shih, Yu Liu, and Wei-Chun Hsu; "Institute of Biomedical Engineering, National Taiwan Univ., Taipei, Taiwan; "Dept. of Physical Education, Chinese Culture Univ., Taipei, Taiwan

11:15-11:30 Difference of running motion by difference of shoes about swing -- back velocity of driving leg immediately before foot contact on the ground #6002
Shunichi Tazuke; Doshisha Univ., Kyoto, Japan

11:30-11:45 Effect of maturation on the relationship between physical performance and body size #6101
Aleksandar Nedeljkovic, Dragan M. Mirkov, Milos Kukolj, Dusan Ugarkovic, Slobodan Jareci; "The Research Center, Faculty of Sport and Physical Education, Belgrade Univ., Serbia and Montenegro; "Dept. of Health, Nutrition, and Exercise Sciences, Univ. of Delaware, USA

11:45-12:00 A Three-Dimensional Kinematic Analysis of the Ball and Racket During First and Second Tennis Serves #6406
Ching-Cheng Chiang, Jinn-Yen Chiang, and Chung-Yu Chen; "National College of Physical Education & Sports, Taoyuan County, Taiwan; "National Changuh Univ. of Education, Changhua County, Taiwan; "National Taiwan College of Physical Education, Taichung, Taiwan

12:00-12:15 Isomap Transform For Segmenting Human Body Shape #7361
Pietro Cerveri, Elena De Momi, Ricardo Machado Leite De Barros, Giancarlo Ferrigno; "TBM Lab, Bioengineering Dept., Politecnico di Milano, Milan, Italy; "Laboratório de Instrumentação para Biomecânica, Faculdade de Educação Física, Universidade Estadual de Campinas, Brazil

9. Tissue Engineering
(Including presentations from Thread 3 Biomechanics at Micro- and Nanoscale Levels
Thread organizer: Hiroshi Wada)

Track Coordinators: Axel Stemberger, Ralf Huss, Takashi Ushida

9.1.1 Bone Tissue Engineering and Cell Mechanbiology
Session Organizers: Christian Oddou, Alicia el-Haj
Chairs: A. J. El Haj
Monday, July 31
Room R1.005

11:00-11:30 Keynote: Magnetic nanoparticle-based tagging of mechanosensors for bone tissue engineering #6604
Institute of Science and Technology in Medicine, Keele Univ. Medical School, Stoke on Trent, UK

11:30-11:45 Effect of mechanical strain on osteogenic progenitor cells in a collagen matrix #4867
Angela Thiel, Ludwika Kreja, Benedikt Friemert, Gerolf Bergenthal, Lutz Claes, Anita Ignatius; "Institute of Orthopaedic Research and Biomechanics, Univ. of Ulm, Germany; "Military Hospital, Dept. of Surgery, Ulm, Germany

11:45-12:00 Mesenchymal Stem Cells Loaded onto Plldla Scaffolds Differentiated Towards an Osteogenic Potential Influence of Fluid Flow #7155
E. Potier, K.Oudina, E. Arnaud, Ville Ellä, M. Kellomäki, N. Ashammakh, Pierre J, Oddou C, and H. Petite; "UMR CNRS 7052, Univ. Paris 7 & Paris 12, Paris, France; "Institute of Biomaterials, Tampere Univ. of Technology, Tampere, Finland; "Tampere Univ. of Technology, Tampere, and Dept. of Surgery, Oulu Univ. Hospital, Oulu, Finland
12:00-12:15 Growth promoting \textit{in vitro} effect of synthetic cyclic RGD-peptides on human osteoblast-like cells attached to cancellous bone #6422
Ursula Magdolen\(^a\), Jörg Auernheimer\(^b\), Claudia Dahmen\(^b\), Reiner Gradinger\(^a\), Horst Kessler\(^a\), Manfred Schmitt\(^a\), Peter Diehl\(^a\); \(^a\)Dept. of Orthopedic Surgery and \(^b\)Clinical Research Unit, Dept. of Obstetrics and Gynecology, Technische Universität München, Munich, Germany

12:15-12:30 Temporal expression of osteogenic markers in mesenchymal stem cells when cultured in monolayer and on collagen glycosaminoglycan scaffolds #6542
Farrell, E; Prendergast, P.J.; O’Brien, F.J., Campbell V.A; Dept. of Physiology, Trinity College Dublin, Ireland; Trinity Centre for Bioengineering, Trinity College Dublin, Ireland

10. Cellular and Molecular Mechanics
10.1.2 Cell Mechanics: Biomechanics at Micro- and Nanoscale Levels
Session Organizers: Kazuo Tanishita, Ed Guo
Monday, July 31
Room R0.056

11:00-11:15 Regulation of cellular configuration by cell-cell adhesion in the 3D stacked-up culture of rat primary hepatocytes #5081
Ryo Sudo\(^a\), Toshihiro Mitaka\(^a\), Mariko Ikeda\(^a\), Kazuo Tanishita\(^a\)
\(^a\)Dept. of System Design Engineering, Keio Univ., Yokohama, Japan

11:15-11:30 Withdrawn

11:30-11:45 Investigation of the mechanical role of cytoskeletal structures in traction forces of smooth muscle cells using different configurations of micropillars #5520
Toshiro Ohashi\(^a\), Junichi Yamazaki\(^a\), Norifumi Kamed\(^a,b\), Masaaki Sato\(^a\); \(^a\)Graduate School of Engineering, Tohoku Univ., Sendai, Japan; \(^b\)Present affiliation: Yokohama Rubber Co., Ltd., Hirasuka, Japan

11:45-12:00 Increased cytoskeletal dynamics of invasive vs. non-invasive tumor cells #6575
Claudia Mierke, Philip Kollmannsberger, Johannes Pauli, Ben Fabry
Center for Medical Physics and Technology, Univ. of Erlangen-Nürnberg, Germany

12:00-12:15 Investigating the Role of Proteoglycans in Fibril Sliding: Altering the ECM of the Bovine Inner Annulus Fibrosus #7514
Dorothy Thomas\(^a\), John Matyas\(^b\), Neil Duncan\(^a\); \(^a\)Dept of Civil Engineering, \(^b\)Dept of Cell Biology and Anatomy, Univ. of Calgary, Calgary, AB, Canada

12:15-12:30 Application of DNA Technology to Signal Processing in Mechanical Systems #6706
Quan-Fang Wang; Dept. of Automation and Computer Aided Engineering, The Chinese Univ. of Hong Kong, Hong Kong

14. Cardiovascular Mechanics
14.1.2 AAAs and Stent-Grafts
Session Organizers /Chairs: Tim McGloughlin, Ender A. Finol
Monday, July 31
Room G0.01

11:00-11:15 The influence of 3D geometry on abdominal aortic aneurysm wall stress # 4063
Yannis Papaharilaou\(^a\), John Ekaterinari\(^b\), Evaggelos Karatzis\(^a\); \(^a\)Institute of Applied and Computational Mathematics, Foundation for Research and Technology-Hellas, Heraklion, Crete, Greece; \(^b\)Dept. of Mechanical and Aerospace Engineering, Univ. of Patras, Greece

11:15-11:30 Experimental and numerical studies on physiological flow behaviour in an asymmetric model of abdominal aortic aneurysm #5552
Emmanuel Gaillard, Valérie Deplano, Olivier Boiron, Eric Bertrand
IRPHE UMR 6594, Equipe de Biomécanique Cardiovasculaire, Marseille, France

11:30-11:45 Rupture Mechanisms in Circulatory System Vascular Tissue #5187
Henry W. Haslach, Jr.; Department of Mechanical Engineering, University of Maryland, USA
11:45-12:00  Relationship between growth rate and maximum wall stress in abdominal aortic aneurysms #5454  
*Dept. of Chemical Engineering, South Kensington Campus, *Vascular Surgery and Radiology, *NHLI, International Centre for Circulatory Health, St Mary’s Hospital & Imperial College London, UK

12:00-12:15  Reduction of post-operative abdominal aortic graft pressures #5791  
Timothy M. McGloughlin*, Liam G. Morris* and Thomas P. O Briens  
*Centre for Applied Biomedical Engineering Research and Materials and Surface Science Institute, Dept. of Mechanical and Aeronautical Engineering, Univ. of Limerick, Limerick, Ireland; *Dept. of Mechanical Engineering, Galway Mayo Institute of Technology, Galway, Ireland.

12:15-12:30  Pulsatile Movement of the Zenith Aortic Stent-Graft #5254  
Benjamin A Howell*, David Salonerb, Jeanne M LaBergeb, Timothy AM Chuterb  
a Dept. of Vascular Surgery, UCSF, San Francisco, USA; b Dept. of Radiology, UCSF, San Francisco, USA

14. Cardiovascular Mechanics  
14.1.3 Vascular Wall Mechanics - Biomechanical analysis from molecular to tissue level  
Session Organizers /Chairs: Gerhard Holzapfel, Takeo Matsumoto  
Monday, July 31  
Room G1.27

11:00-11:15  Biomechanical properties of carotid arteries from wild-type mice and dystrophin and sarcoglycan-δ knockout mice #5695  
Seungik Baek*, Rudolph L. Gleason*, Wendy Dyeb, Emily Wilsonb, and Jay D. Humphreya  
a Biomedical Engineering and Systems Biology and b Medical Physiology, Texas A&M Univ., College Station, TX, USA; *Mechanical and Biomedical Engineering, Georgia Institute of Technology, Atlanta, GA, USA

11:15-11:30  Arterial Wall Stress Influences Remodeling #5169  
Yu Shin Kia, Zorina Galisb, Raymond Vitoa; a Georgia Institute of Technology, Atlanta, USA; b Eli Lilly & Co., Indianapolis, USA

11:30-11:45  Quantification of 3-D Collagen Distributions On The Human Carotid Arterial Plaque Fibrous Cap#5605  
Choudhury A. a, Das S.a, Kill I.b, Long Q.a; a Brunel Institute Of Bioengineering, b School of Health Sciences and Social Care, Brunel Univ., Uxbridge, Middlesex, UK; * Dept. Of Cardiovascular Surgery, Hillingdon Hospital, Middlesex, UK

11:45-12:00  Influence of residual strains on stress distribution in human vulnerable coronary atherosclerotic plaque #4197  
J. Ohayon*, G. Finet¹, O. Dubreuil², G. Rioufol³, S. Le Floch-h⁴ and P. Tracqui⁵  
¹Laboratory TIMC-IMAG-UJF-CNRS UMR 5525,IN3S, La Tronche Cedex, France; ²Dept. of Hemodynamics and Interventional Cardiology, Hospices Civils de Lyon, France.

12:00-12:15  Morphological analysis of normal and decellularised porcine carotid arteries #4728  
S. Roy, P. Silacci and N. Stergiopoulos; Ecole Polytechnique Fédérale de Lausanne (EPFL), Hemodynamics and Cardiovascular Technology Laboratory (LHTC), Lausanne, Switzerland

12:15-12:30  Circumferential variation of mechanical properties of ascending aorta (AA): a comparative study of healthy and dilated AA #6124  
Dominique Tremblay*, Nusrat Choudhury*, Jagdish Butany*, Raymond Cartier5, Rosaire Mongrain4, Richard L. Leask4, * Dept. of Chemical Engineering, McGill Univ., Montreal, Canada; 5 Dept. of Pathology, Toronto Medical Laboratories, Toronto General Hospital/Univ. Health Network, Toronto, Canada; 4 Montreal Heart Institute, Montreal, Canada; 4 Dept. of Mechanical Engineering, McGill Univ., Montreal, Canada

16. Reproductive Biomechanics  
16.2 Placental Vasculature and Blood Flow  
Session Organizers: Christiane Pfarrer, Martin JC van Gemert  
Chair: Christiane Pfarrer
Monday, July 31
Room R0.006

11:00-11:15 Smoking during pregnancy and IUGR lead to adverse fetal villous and vascular development #4841
Christian Pfarrer, John CP Kingdom, Rudolf Leiser; Dept of Obstetrics and Gynecology, Justus-Liebig-Univ., Giessen, Germany; Dept. of Obstetrics and Gynecology, Mount Sinai Hospital, Toronto, Canada; Dept. of Veterinary Anatomy, Histology and Embryology, Justus-Liebig-Univ., Giessen, Germany

11:15-11:30 Twin-twin transfusion syndrome modeling #5676
Martin JC van Gemert, Jeroen PHM van der Wijngaard; Laser Center and Dept. of Obstetrics, Academic Medical Center, Univ. of Amsterdam, Amsterdam, The Netherlands

11:30-11:45 The circulation of acardiac twins in monochorionic twin pregnancies #5671
Martin J.C. van Gemert, Jeroen P.H.M. van der Wijngaard; Laser Center and Dept. of Obstetrics, Academic Medical Center, Univ. of Amsterdam, Amsterdam, The Netherlands

11:45-12:00 Hemodynamics of fetal blood flow in Hyrtl anastomosis #5663
Zoya Gordon, Osnat Eytan, Ariel J. Jaffa, David Elad; Dept. of Biomedical Engineering, Tel Aviv Univ., Tel Aviv, Israel; Lis Maternity Hospital, Tel Aviv Sourasky Medical Center, Tel Aviv, Israel

12:00-12:15 Mathematical Modelling of Blood Flow and Oxygen Transport in the Human Placenta #4472
Christopher J. Smith, Stephen K. Wilson, Brian R. Duffy; Dept. of Mathematics, Univ. of Strathclyde, Glasgow, Scotland, UK.

12:15-12:30 Analysis of the placental vasculature network #5661
Zoya Gordon, Osnat Eytan, Ariel J. Jaffa, David Elad; Dept. of Biomedical Engineering, Tel Aviv Univ., Tel Aviv, Israel; Lis Maternity Hospital, Tel Aviv Sourasky Medical Center, Tel Aviv, Israel

17. Biomechanics in Nature
17.2.1 Microorganisms
Session Organizer: Tim Pedley
Monday, July 31
Room R1.087

11:00-11:15 Force and Flexibility of Flailing Myxobacteria # 4254
Charles W. Wolgemuth; Dept. of Cell Biology, Univ. of Connecticut Health Center, Farmington, CT, USA

11:15-11:30 Synchronization of rotating flagella by hydrodynamic interactions #5320
Holger Stark and Michael Reichert; Universität Konstanz, Fachbereich Physik, Konstanz, Germany

11:30-11:45 Hydrodynamic interaction of two swimming Caudatum #4282
Takuji Ishikawa, Masateru Hota and T.J. Pedley; Dept. Mech. Eng., Univ. of Fukui, Fukui City, Japan; DAMTP, Univ. of Cambridge, CMS, Cambridge, UK

11:45-12:00 Hydrodynamic aggregation and diffusion in populations of model micro-organisms #4823
T.J. Pedley, T. Ishikawa; Univ. of Cambridge, UK, Fukui Univ., Japan

12:00-12:15 Flagella-Driven Flows Enhance Long-Range Transport of Molecular Nutrients #5505
Martin B. Short, Cristian Solar, Sujoy Ganguly, Thomas R. Powers, John O. Kessler and Raymond E. Goldstein; Dept. of Physics, Univ. of Arizona, Tucson, AZ, USA

12:15-12:30 Flow Field for a Microorganism Swimming in a Porous Medium #7545
N.A. Hill; Dept. of Mathematics, Univ. of Glasgow, Glasgow, Scotland, U.K.
18. Trends in Cranial and Spinal Biomechanics  
18.2.1 Imaging and management of CSF dynamics  
(Incorporating presentations from Thread 2: Flow-Structure Interaction; Thread Organizers: Chris Bertram, Ross Ethier, Charlie Ellington)  
**Session Organizers**: Chris Bertram, Ross Ethier, Charlie Ellington  
**Chair**: C. Bertram, Ross Ethier  
**Monday, July 31**  
**Room R2.007**

**11:00-11:30**  
**Keynote: Spinal cord mechanics: a hypothesis for syringomyelia genesis and progression, investigated by means of a computer model #5489**  
C.D. Bertram\(^a\), L.E. Bilston\(^b\), M.A. Stoodley\(^b\)  
\(^a\) Graduate School of Biomedical Engineering, Univ. of New South Wales, Sydney, Australia; \(^b\) Prince of Wales Medical Research Institute, Barker Street, Randwick, New South Wales, Australia

**11:30-11:45**  
**Fluid-structure interactions in structural neurological diseases #5494**  
Lynne E. Bilston\(^a\), S. Cheng\(^b\), David F. Fletcher\(^b\), M.A. Stoodley\(^a\)  
\(^a\) Prince of Wales Medical Research Institute, Univ. of New South Wales, Randwick, Sydney, Australia; \(^b\) Dept. of Chemical Engineering, Univ. of Sydney, Sydney, Australia

**11:45-12:00**  
**A fluid structure flow interaction model of the ventricular system #5504**  
Shaokoon Cheng\(\text{\normalfont }^a\), Lynne Bilston\(^a\)  
\(^a\) Prince of Wales Medical Research Institute, Univ. of New South Wales, Sydney, Australia; \(^b\) Graduate School of Biomedical Engineering, Univ. of New South Wales, Sydney, Australia

**12:00-12:15**  
**Computational modelling of CSF motion within the Human Central Nervous System #4336**  
L. Howden\(^a\), D. Giddings\(^a\), A. Aroussi\(^a\), H. Power\(^a\), M. Vloeberghs\(^b\), D. Walker\(^b\) & M. Garnett\(^c\)  
\(^a\) School of Mechanical, Materials and Manufacturing Engineering, Univ. of Nottingham, UK; \(^b\) School of Human Development, Faculty of Medicine and Health Sciences, Univ. of Nottingham, UK; \(^c\) School of Pharmacy, Univ. of Nottingham, UK

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20. Biomechanics of Organs  
20.1.2.1 Biomechanics and Cell and Tissue Engineering of the Anterior Segment  
**Session Organizers**: Darryl Overby, Jeff Ruberti  
**Monday, July 31**  
**Room R1.008**

**11:00-11:15**  
**Traditional and ultrasonic mechanical analysis of porcine iris #7217**  
Julie E. Whitcomb\(^a\), Dalong Liu\(^b\), Emad Ebbini\(^c\), Victor H. Barocas\(^b\), \(^a\) Dept of Mechanical Engineering, Univ. of Minnesota, Minneapolis, MN, USA; \(^b\) Dept of Biomedical Engineering, Univ. of Minnesota, Minneapolis, MN, USA; \(^c\) Dept of Electrical Engineering, Univ. of Minnesota, Minneapolis, MN, USA

**11:15-11:30**  
**Modeling the human cornea – a stromal tissue constitutive model based on measured collagen architecture #5433**  
P.M. Pinsky\(^a\), D. van der Heide\(^e\), D. Chernyak\(^b\), K.M. Meek\(^b\) and C. Boote\(^b\); \(^a\) Stanford Univ., Stanford, CA, USA; \(^b\)AMO Inc., Santa Clara, CA, USA; \(^c\)Cardiff Univ., Cardiff, UK

**11:30-11:45**  
**Spatial Organization of Engineered Corneal Stroma: Is there a need for contact guidance or direct mechanical stimulus? #6983**  
J.D. Zieske\(^a\), X.Q. Guo\(^a\), S.A. Melotti\(^b\), A.E. Hutcheon\(^b\), J.W. Ruberti\(^b\)  
\(^a\)Schepen's Eye Research Institute, Boston, MA, USA; \(^b\)Mechanical and Industrial Engineering, Northeastern Univ., Boston, MA, USA

**11:45-12:00**  
**Nucleation, growth and alignment of collagen fibrils produced by shear-influenced self-assembly for corneal tissue engineering templates #5342**
12:00-12:15  The Relationship between the Hydrodynamic Patterns of Aqueous Humor Outflow and Outflow Resistance #6768
Darryl R. Overby, Sara R. Hofmann, Stephanie A. Kasper, Z. Lu, Haiyan Gong
Tulane Univ., New Orleans, LA, USA; Boston Univ. School of Medicine, Boston, MA, USA

12:15-12:30  Effect of cyclic biomechanical stress on fluid flow through conventional drainage tissues #6131
Renata F. Ramos, W. Daniel Stamer; Ophthalmology and Vision Science, The Univ. of Arizona, Tucson, AZ, U.S.A

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.1.2 Computational Modelling and Mechanobiology of Cells
Session Organizers /Chairs: Gerhard A. Holzapfel, Dimitrije Stamenovic
Monday, July 31
Room R1.006

11:00-11:30  Keynote: Cells feel matrix stiffness - Simple models and computational insights #6926
Shamik Sen, Adam J. Engler, and Dennis E. Discher; Pennsylvania Muscle Institute and Biophysical Engineering Lab, Univ. of Pennsylvania; Philadelphia, PA, USA

11:30-11:45  Dynamics of a polymer chain under tension as a model of rheology of the cytoskeleton #5334
Noah Rosenblatt, Adriano M. Alencar, Arnab Majumdar, Béla Sukí, Dimitrije Stamenović
Dept. of Biomedical Engineering, Boston Univ., Boston, MA, USA; Dept. of Environmental Health, Harvard School of Public Health, Boston, MA, USA

11:45-12:00  Models of cytoskeletal biopolymer networks: modes of deformation and force transmission #5352
FC MacKintosh; Dept. of Physics and Astronomy, Vrije Universiteit, Amsterdam

12:00-12:15  Finite-element model of the adhesion-cytoskeleton-nucleus mechanotransduction pathway in endothelial cells #5497
Alexander A. Spector, Ronald P. Jean, Christopher S. Chen
Dept. of Biomedical Engineering, Johns Hopkins Univ., Baltimore, Maryland, USA; Dept. of Bioengineering, Univ. of Pennsylvania, Philadelphia, Pennsylvania, USA

12:15-12:30  Mechanics and Mechanisms of Nuclear Deformation #6189
A. Vaziri, H. Lee, R. D. Kamann, and M. R. Kaazempur Mofrad
Div. of Engineering and Applied Sciences, Harvard Univ., Cambridge, MA, USA; Depts. of Mechanical and Biological Engineering, MIT, Cambridge, MA, USA; Dept. of Bioengineering, Univ. of California, Berkeley, CA

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.15.2 Time Domain Reduced Modelling in Biological Fluid Dynamics
Session Organizer: Timothy David
Monday, July 31
Room R1.002

11:00-11:20  Outflow boundary conditions for three-dimensional simulations of non-periodic blood flow and pressure fields in deformable arteries #6695
Dept. of Mechanical Engineering; Dept. of Pediatrics; Dept. of Bioengineering and Surgery, Stanford Univ., Stanford, CA, USA; Dept. of Mechanical, Aeronautical & Nuclear Engineering, Rensselaer Polytechnic Institute, Troy, NY, USA

11:20-11:40  An experimental arterial network as validation of a 1D time-space numerical flow model #5163
Koen S Matthys, Jordi Alastructural-Arimon, Kim H Parker, Ashraf W Khir, Patrick Segers
Pascal R Verdonck, Joaquim Peiró, Spencer J Sherwin; Dept. of Mechanical Engineering, Imperial College London, London, UK; Dept. of Bioengineering, Imperial College London, London, UK; School of Engineering and Design, Brunel Univ., Uxbridge, Middlesex, UK; Cardiovascular Mechanics and Biofluid Dynamics Research Unit, Institute Biomedical Technology, Ghent Univ., Ghent, Belgium
11:40-12:00 Wave Intensity Analysis: A New Approach to Studying Waves in Arteries and Elastic Tubes #6750
Khir AW, Parker KH; Brunel Institute for Bioengineering, Brunel Univ., Middlesex, UK; Physiological Flow Studies Group, Dept. of Bioengineering, Imperial College London, UK

12:00-12:20 Effects of aortic stenosis and concomitant hypertension on left ventricular stroke work #7284
Damien Garcia, Lyes Kadem, Philippe Pibarot, Louis-Gilles Durand; Laboratory of biomedical engineering, IRCM, Montreal, Canada; Quebec Heart Institute, Laval Hospital, Quebec, Canada

Thread 1: Computational Methods in Biomechanics and Mechanobiology

T1.16.1 Computational Methods for Modeling of Hearing
Session Organizers: Karl Grosh, Edward Givelberg
Chair: Edward Giverlberg

Monday, July 31
Room R1.007

11:00-11:30 Keynote: Radial profile of the basilar membrane in a coiled cochlea: results and biological implications #7535
Daphne Manoussaki, Emílios K. Dimitriadis, Richard S. Chadwick
Dept. of Mathematics, Vanderbilt Univ., Nashville, TN, USA; Division of Bioengineering & Physical Science, ORS/OD, NIH, Bethesda, MD, USA; Section on Auditory Mechanics, NICDD, NIH, Bethesda, MD, USA

11:30-11:45 Middle ear acoustico-mechanical interactions using a multifrequency finite element approach #5424
James P. Tuck-Lee, Peter M. Pinsky and Sunil Puria; Dept. of Mechanical Engineering, Stanford Univ., Stanford, CA, USA; Dept. of Otolaryngology-Head and Neck Surgery, Stanford Univ., Stanford, CA, USA

11:45-12:00 Withdrawn

12:00-12:15 How does the inner ear generate distortion product otoacoustic emissions? Results from a mathematical model of the mammalian cochlea #6567
Aleš Vetesič, Renato Nobili, Anthony W. Gummer; Dept. Otolaryngology, Univ. Tuebingen, Tuebingen, Germany; Dept. of Physics “G. Galilei”, Univ. of Padova, Padova, Italy

12:15-12:30 Towards a physiological model of the cochlea #7040
Niranjan Deo, Karl Grosh; Mechanical Engineering Dept., Univ. of Michigan, Ann Arbor, MI, USA

Monday, July 31
14:00-15:30

1. Bone Mechanics – Joint ESB Track
1.1.3 Ultrasound for Detection of Bone Quality
Chairs: Pascal Laugier, Kay Raum

Monday, July 31
Room R 0055

14:00-14:30 Keynote: What can ultrasound teach us about bone quality? #6823
Pascal Laugier; Laboratoire d’Imagerie Paramétrique, UMR CNRS 7623, Université Pierre et Marie Curie - Paris 6, Paris, France

14:30-14:45 Experimental Simulation of Bone Osteoporosis-Influence of Microarchitecture
Alterations on Ultrasonic Backscattering #5014
Despina Deligianni and Costas Apostolopoulos; Biomechanical Engineering Lab, Dept. of Mechanical Engineering & Aeronautics, Univ. of Patras, Rion, Greece

14:45-15:00 Using Peripheral Quantitative Ultrasound to Predict Fracture Mechanics and Compressive Properties at the Head of the Femur #6404
2 Musculoskeletal Mechanics-Joint ISB Track

2.1.3 Cartilage Biomechanics
Session Organizer: Van C. Mow
Monday, July 31
Room R1.049

14:00-14:15 An Exact Solution for Charged-Hydrated Biological Tissues under Unconfined Compression: The Triphasic Paradigm #7802
Leo Q. Wan, Chester Miller, X. Edward Guo, Van C. Mow; Dept. of Biomedical Engineering, Columbia Univ., New York NY, USA

14:15-14:30 Determination of tension-compression nonlinear properties and fixed charge density of articular cartilage using a triphasic, conewise linear elastic model #7803
Morakot Likhitpanichkul, Leo Q Wan, X Edward Guo and Van C Mow
Depts. of Mechanical and Biomedical Engineering; Columbia Univ., New York

14:30-14:45 Triphasic Indentation of Articular Cartilage: The Simultaneous Determination of both Mechanical Properties and Fixed Charge Density #7804
Xin L. Lu, Chester Miller, X. Edward Guo, Van C. Mow
Dept. of Biomedical Engineering, Columbia Univ.; New York, NY, USA

14:45-15:00 Effect of Glycosaminoglycan (GAG) Depletion on Cartilage Friction under Various Tribological Conditions #4862
Jayanth Katta, Zhongmin Jin, Eileen Ingham, John Fisher; IMBE, School of Mechanical Engineering, Univ. of Leeds, Leeds, UK

2 Musculoskeletal Mechanics-Joint ISB Track

2.8.3 Functional tissue engineering of ligaments and tendons
Session Organizers /Chairs: Savio L.Y. Woo, Richard E. Debski, Steve Abramowitch
Monday, July 31
Room R1.004

14:00-14:15 Natural extracellular matrices for tendon tissue engineering #5244
Kathleen Derwin, Andrew Baker, Joseph Iannotti; The Cleveland Clinic Foundation, Cleveland, OH, United States

14:15-14:30 Interface Tissue Engineering and Biological Fixation of Soft Tissue Grafts #7588
Lu HH, Spalazzi JP, and Wang IE; Biomaterials and Interface Tissue Engineering Laboratory, Columbia Univ., New York NY USA

14:30-14:45 A Novel Tissue Engineered Scaffold for Anterior Cruciate Ligament Repair: Relation of Functional Properties to Scaffold Structure #5083
Cato T. Laurencin, Joseph W. Freeman, Mia D. Woods; Univ. of Virginia, Charlottesville, VA

14:45-15:00 Novel Silk Scaffold/Cell-Sheet system for Ligament and Tendon Tissue Engineering #5534
JCH Gohab, SL Tohb, c; Dept. of Orthopedic Surgery, NUS Tissue Engineering Program, Office of Life Sciences, National Univ. of Singapore, Singapore; bDivision of Bioengineering, NUS Tissue Engineering Program, Office of Life Sciences, National
Univ. of Singapore, Singapore; ’Dept. of Mechanical Engineering, NUS Tissue Engineering Program, Office of Life Sciences, National Univ. of Singapore, Singapore

15:00-15:15 Effects of Cyclic Stretching on Anterior Cruciate Ligament-Constructs Fabricated from Human MSCs and Collagen Type I Gels #6337

15:15-15:30 Origin of Mesenchymal Cells in Tendon Healing #5268
Nobuyoshi Watanabe; Dept. of Orthopaedic Surgery, Kyoto Kujo Hospital, Kyoto, Japan

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.1.3.1 Multiple Joints
Session Organizer/Chair: F. U. Niethard
Monday, July 31
Room R 1.046

14:00-14:30 Clinical impact of multiple joint mechanics #7207
F. U. Niethard, C. Disselhorst-Klug, G. Rau; Pauwels-Center Aachen for Musculo-Skeletal Research, Aachen, Germany

14:30-15:00 Contribution of Qualitative Evaluation of Movement Performance to Decision-Making in Clinical Applications #7205
C. Disselhorst-Klug, T. Schmitz-Rode, G. Rau; Helmholtz-Institute for Biomedical Engineering, Chair for Applied Medical Engineering, Aachen, Univ. of Technology, Germany

15:00-15:15 A Lightweight Device To Measure Upper-Extremity Kinematics #4645
Gonzalez RV and Koblijska JA; LeTourneau University, Longview, TX, USA

15:15-15:30 A biomechanical body model allowing calculation of anatomical joint angles of upper extremities during unconstrained movements #7208
F. Kohler, T. Schmitz-Rode, G. Rau, C. Disselhorst-Klug
Applied Medical Engineering, Helmholtz-Institute, RWTH Aachen Univ., Germany

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.1.4.3 Upper Extremity
Session Organizers: Franz van der Helm, C. Disselhorst-Klug
Monday, July 31
Room R2.091

14:00-14:15 Upper limb anthropometry for children aged from 3 to 15 years #5139
Christophe Bartoli, Loïc Lalys, Thierry Serre, Christian Brunet, Georges Leonetti
a Unité d’Anthropologie, UMR 6578 - CNRS/Université de la Méditerranée, Marseille, France
b Laboratoire de Biomécanique Appliquée UMRT24 - INRETS/ Université de la Méditerranée, Marseille, France

14:15-14:30 Finite Element Analysis of Composite Fixation for Total Elbow Prosthesis #4131
Mark E. Zobitz, Bernard F. Morrey, Kai-Nan An
a Orthopedic Biomechanics Laboratory, Mayo Clinic, Rochester, MN, USA

14:30-14:45 A “Virtual Sensor” Tool To Simulate Accelerometers For Upper Limb Fes Triggering #4814
S. B. Thies, P. A. Tredard, L. Kenney, D. Howard, J. Y. Goulermas, C. Smith, J. Rigby Centre for Rehabilitation and Human Performance Research, Univ. of Salford, Salford, Manchester, UK

14:45-15:00 Contact areas and contact pressures in the canine carpal joint #4801
Annette Kaiser, Johann Maierl, Hans-Georg Liebich
Institute of Veterinary Anatomy, Ludwig-Maximilians-Universität, Munich, Germany

15:00-15:15 Calculating joint movement of the shoulder complex using the proposed ISB standardizations #5721
Lianne Jones, Cathy A. Holt, Amy Bowers; Cardiff School of Engineering, Cardiff Univ., Cardiff, Wales, UK

4. Implants for Trauma and Orthopedics-Joint ESB Track
4.2.2 Hip Endoprosthetics - Acetabular Implants

Chairs: Marco Barink, Christof Hurschler
Monday, July 31
Room E1.03

14:00-14:15  Loss in mechanical contact of cementless acetabular prostheses due to post-operative weight bearing: a biomechanical study #5057
Chiara Maria Bellini a,b, Fabio Galbusera a,c, Arianna Colombini a,b, Roberto Giacometti Ceroni d, Manuela Teresa Raimondi a,c; a Laboratory of Biological Structure Mechanics, Politecnico di Milano, Milan, Italy; b Dept. of Bioengineering, Politecnico di Milano, Milan, Italy; c Dept. of Structural Engineering, Politecnico di Milano, Milan, Italy; d Istituto Ortopedico Galeazzi, Milan, Italy

14:15-14:30  Towards a more realistic finite element prediction of micromotion of uncemented acetabular cups #4040
Dennis Janssen and Nico Verdonschot; Orthopaedic Research Lab, Radboud Univ. Nijmegen Medical Centre, Nijmegen, The Netherlands

14:30-14:45  Load transmission through conventional and highly cross-linked polyethylene in THA subjected to stress wave loading #5730
Yuji Tanabe a, Hirotsugu Ohashi b; a Dept. of Mechanical and Production Engineering, Niigata Univ., Niigata, Japan; b Dept. of Orthopaedic Surgery, Saiseikai Nakatsu Hospital, Osaka, Japan

14:45-15:00  Luxation behaviour of different ceramic on ceramic couplings #7729
Th. Oberbach a, W. Glien b, S. Begand c, C. Kaddick d, Mathys Orthopaedie GmbH, Moersdorf, Germany; b Endolab GmbH, Thansau / Rosenheim; Germany

15:00-15:15  Constraint inserts for total hip replacement. Experimental analysis of retention and luxation behavior #6367
Erwin Steinhauser a, Rainer Bader b, Stefan Eichhorn a, Martin Simnacher a, Reiner Gradinger a; a Klinik für Orthopädie und Unfallchirurgie, TU München, Germany; b Orthopädische Klinik und Poliklinik, Universität Rostock, Germany; c Plus Orthopedics, Aarau, Switzerland

15:15-15:30  Failure of polyethylene inlays in cementless total hip arthroplasty – an analysis of 50 retrievals of one design #6199
C. Heisel, C. Lee, R.G. Bitsch, M. Thomsen; Laboratory of Biomechanics and Implant Research, Univ. of Heidelberg, Dept. of Orthopaedics, Heidelberg, Germany

5. Occupational and Impact Injury Biomechanics

5.2.2 Whiplash and Neck Injury Biomechanics

Session Organizers /Chairs: Brian Stemper, Beth Winkelstein
Monday, July 31
Room R0.058

14:00-14:15  Comparative Performance of Various Test Dummies in the Biomechanical Assessment of Whiplash Injury Risk Factors #5186
Michael Kleinberger, Andrew Merkle, and Liming Voo; The Johns Hopkins Univ. Applied Physics Laboratory, Laurel, Maryland, USA

14:15-14:30  Superficial and deep neck muscle activity during isometric, voluntary and reflex contractions #5132
Gunter P. Siegmund a,b, Jean-Sébastien Blouin b, John R. Brault a, Sofia Hedenstierna a, J. Timothy Inglis b; a School of Human Kinetics, Univ. of British Columbia, Vancouver, BC, Canada; b Division of Neuromuscular Engineering, Royal Institute of Technology, Huddinge, Sweden

14:30-14:45  Occupant awareness affects whiplash biomechanics #5743
BD Stemper, N Yoganandan, FA Pintar; Medical College of Wisconsin and VA Medical Center, Milwaukee, WI, USA
5. Occupational and Impact Injury Biomechanics

5.10.3 Ergonomics

Session Organizers /Chairs: Heiner Bubb, M. Xuguang Wang
Monday, July 31
Room R0.003

14:00-14:15 On-Body Lift Assist reduces back moments and EMG during asymmetric freestyle lifting
Mohammad Abdoli E., Joan M. Stevenson; Biomechanics Laboratory, Queen’s University, Kingston, Ontario, Canada

14:15-14:30 Positioning a human numerical model #5781
Samuel Bidal a, Kambiz Kayvantash b, a MECALOG, Marseille, France; b MECALOG, Antony, France

14:30-14:45 Sleep comfort: optimization through customization #7228
Bart Haex a, Hans Druyts b, Cristian Forausberger a, Karel Van Brussel b, Tom De Wilde a, Remy Van Audekercke a, Georges Van der Perre a, Jos Vander Sloten b
a Biomechanics and Engineering Design, Katholieke Universiteit Leuven, Leuven, Belgium; b Custom8 NV, Leuven, Belgium

6. Sport Biomechanics-Joint ISB Track

6.1.2.1 Functional Anatomy

Session Organizers: Albert Gollhofer, Janne Avela
Monday, July 31
Room D2.12

14:00-14:15 Training Induced Adaptations in Characteristics of Postural Reflexes in Elderly Men #6920
Urs Granacher, Albert Gollhofer; Institute of Sport and Sport Science, Univ. of Freiburg, Germany

14:15-14:30 Acute and prolonged adaptation of the human connective tissue to exercise #7869
Henning Langberg; Institute of Sports Medicine, Bispebjerg Hospital, Copenhagen, Denmark

14:30-14:45 Relevance and significance of in vivo determination of ankle joint axes #7662
Wilfried Alt, Harald Hochwald; Institute of Sports Science, University of Stuttgart, Germany

14:45-15:00 Form and Function – Clinical Problems #6992
Heinz Lohrer, Sportmedizinisches Institut Frankfurt am Main, Germany

15:00-15:15 Neuromuscular control in extreme high impact loads #7724
Avela Janne a, Ishikawa Masaki a, Nicol Caroline b, Chavet Pascale b, Peltonen Jussi a & Komi Paavo b; a Neuromuscular Research Center, Dept. of Biology of Physical Activity, Univ. of Jyväskylä, Finland; b Dept. of Biology of Physical Activity, Univ. of the Mediterranean, Marseilles, France

15:15-15:30 Therapeutic efficiency and preventive aspects in functional footwear and insert supply #7603
F. Mayer, H. Baur, A. Hirschmüller, S. Müller; Univ. of Potsdam, Institute of Sports Medicine and Prevention, Potsdam, Germany
6. Sport Biomechanics-Joint ISB Track

6.10.1 Vibration Load in Sport -Fundamentals on Vibration
Session Organizers /Chairs: Joachim Mester, James Wakeling
Monday, July 31
Room R 1.003

14:00-14:30 Keynote: Impact forces, soft tissue vibrations and muscle tuning – injury prevention and training effect #6297
Benno M. Nigg a and Katherine A. Boyera; Human Performance Lab, Univ. of Calgary, Canada

14:30-14:45 Cardiovascular effects of whole-body vibration #5028
Yue Zengyuana, Mester Joachim

14:45-15:00 Soft tissue vibrations and muscle tuning- quantification methods #6296
Katherine A. Boyera and Benno M. Nigg a; Human Performance Lab, Univ. of Calgary, Canada

15:00-15:15 Vibration stimuli and bone response in a rat model #5954
Anja Niehoff, Kirsten Legerlotz, Gert-Peter Brüggemann; Institute of Biomechanics and Orthopaedics, German Sport Univ. of Cologne, Germany

15:15-15:30 The propagation of vibrations through muscle tissue #6269
James Wakeling a, Marco Cardinale b,c, Julie Erskine b,c a Structure and Motion Laboratory, Royal Veterinary College, Univ. of London, UK; b Olympic Medical Institute, Northwick Park Hospital, Harrow, UK; c Univ. of Aberdeen, College of Life Sciences and Medicine, Aberdeen, UK

9. Tissue Engineering

9.1.2 Bone Tissue Engineering
Session Organizers: Axel Stemberger, Alicia el-Haj
Chairs: R. Bizios
Monday, July 31
Room R1.005

14:00-14:30 Keynote: Functional Bone Tissue Engineering #7709
Dietmar W. Hutmacher; Division of Bioengineering, Faculty of Engineering, Dept. of Orthopaedic Surgery, Yong Loo Lin School of Medicine, National Univ. of Singapore

14:30-14:45 The effect of pore size, crosslinking and collagen content on mechanical properties of collagen-GAG scaffolds #6240
Matthew G. Haugh a,b, Ruth M. Walsh a,b, Michael J. Jaasma a,b, Fergal J.O’Brien a,b a Dept. of Anatomy, Royal College of Surgeons in Ireland, Dublin, Ireland; b Trinity Centre for Bioengineering, Trinity College Dublin, Ireland

14:45-15:00 Manufacturing of small featured PCL scaffolds for bone tissue engineering using selective laser sintering #6796
S. Lohfeld, M. Tyndyk, V. Barrona, P. McHugh; National Centre for Biomedical Engineering Science and Dept. of Mechanical and Biomedical Engineering, National Univ. of Ireland, Galway, Ireland

15:00-15:15 Assessment of SLS fabricated scaffolds for skeletal reconstruction in the spine #7086
M. Tyndyk a, S. Lohfeld a, V. Barrona, P. McHugh a,b; a National Centre for Biomedical Engineering Science, NUI, Galway, Ireland; b Dept. of Mechanical and Biomedical Engineering, NUI, Galway, Ireland

15:15-15:30 Advanced Methods of Hard Tissue Scaffold and Implant Fabrication #7756
Agnieszka LIPOWICZ; CAMT, Wrocław Univ. of Technology, Wrocław, Poland
10. Cellular and Molecular Mechanics
10.1.3 Cell Mechanics: Biomechanics at Micro- and Nanoscale Levels
Session Organizers: Kazuo Tanishita, Ed Guo
Monday, July 31
Room R0.056

14:00-14:15 Interplay between crosslinkers and dynamic molecular motor-induced instabilities in the moderation of biopolymer organization #6283
M. Smith

14:15-14:30 Time-dependent and Depth-dependent Compressive Deformation of Articular Cartilage and Chondrocytes #5645
T. Murakami, N. Sakai, Y. Sawae, M. Okamoto, I. Ishikawa, Y. Kurohara; Dept. of Intelligent Machinery and Systems, Kyushu Univ., Fukuoka, Japan

14:30-14:45 Probing Mechanical Heterogeneity in Chondrocytes Using Passive Microrheology #6158
Bomzon Z*, Knight MM*, Bader DL*, Kimmel E*; a Centre for Micro-Photonics, Swinburne Univ. of Technology, Hawthorn, Victoria, Australia; b Medical Engineering Division, Dept. of Engineering and IRC in Biomedical Materials, Queen Mary Univ. of London, UK; c Dept. of Biomedical Engineering, Technion-Israel Institute of Technology, Haifa, Israel

14:45-15:00 Bone Cell Network [Ca^{2+}], Waves: Novel "Neural" Circuitry? #7605
Erica Takai*, Xingyu Jiangc, Qiaobing Xuc, George M. Whitesidec, Kevin D. Costaa, James T. Yardleyb, Clark T. Hung*, and X. Edward Guoa; a Dept. of Biomedical Engineering, b Center for Electron Transport in Molecular Nanostructures, Columbia Univ., New York, NY, U.S.A.; c Dept. of Chemistry and Chemical Biology, Harvard Univ., Cambridge, MA, U.S.A.

14. Cardiovascular Mechanics
14.1.3 Endovascular Aneurysm Repair
Session Organizers/Chairs: Tim McGloughlin, Ender A. Finol
Monday, July 31
Room G0.01

14:00-14:30 Keynote: Wall stress analysis can predict the success of endovascular aneurysm repair #7654
Arindam Chaudhuri*, Pauline Buxton*, Leslie E Ansdell*b, Mohan Adiseshia*a, Anthony J Grass*a; a Vascular Endovascular Unit, Univ. College London Hospitals, London, UK; b Dept. of Civil Engineering, Chadwick Building, Univ. College London, London, UK

14:30-14:45 An In Vitro Assessment of Ancure and Zenith Abdominal Aortic Aneurysm Stent-Graft Devices under physiological conditions #7486
Callanan A a, Kelly D a, Morris L b, Walsh M a, McGloughlin T a; a Dept. Mechanical and Aeronautical Engineering, Centre for Biomedical Engineering Research (CABER) Univ. of Limerick and MSSI, Ireland; b Dept. Mechanical and Industrial Engineering, Galway Mayo Institute of technology, Galway, Ireland

14:45-15:00 A computational model for endovascular graft sizing in abdominal aortic aneurysms #7457
Yannis Papaharilaoua,c, John A. Ekaterinaris a,b, Asterios N. Katsamourisc; a Institute of Applied and Computational Mathematics, Foundation for Research and Technology-Hellas, Heraklion, Greece; b Dept. of Mechanical and Aerospace Engineering, Univ. of Patras, Greece; c Division of Vascular Surgery, Medical School, Univ. of Crete, Greece

15:00-15:15 Investigation of factors influencing the migration of stent-grafts #6843
Anne Geberta, Herbert Imigb, Michael Morlockc, a Biomechanics Section, Hamburg Univ. of Technology, Germany; b Dept. of General-, Vascular- and Visceral Surgery, AK-Hamburg-Harburg, Germany

15:15-15:30 Effect of Residual Aneurysm Pressure on the Bifurcated Stent-Grat #5257
Benjamin A Howell*, Tom Kim*, Angela Cheerb, Harry S Dwyerc, Timothy AM Chuterb; a Dept. of Vascular Surgery, UCSF, San Francisco, USA; Dept. of Mathematics, UC Davis, Davis, USA; b Dept. of Engineering, UC Davis, Davis, USA

14. Cardiovascular Mechanics
14.13.3 Vascular Wall Mechanics -Mathematical and computational modelling

Session Organizers /Chairs: Gerhard Holzapfel, Takeo Matsumoto

Monday, July 31
Room G1.27

14:00-14:15 On experimental testing methods for characterizing the mechanical properties of soft biological materials such as arterial tissues #6745
Gerhard A. Holzapfel a,b, Ray W. Ogden c; a Royal Institute of Technology (KTH), School of Engineering Sciences, Stockholm, Sweden; b Graz Univ. of Technology, Computational Biomechanics, Graz, Austria; c Univ. of Glasgow, Dept. of Mathematics, Univ. Gardens, Glasgow, UK

14:15-14:30 Computational modelling of fibre reorientation and growth in orthotropic biological tissues #4343
Andreas Menzel; Chair of Applied Mechanics, Univ. of Kaiserslautern, Kaiserslautern, Germany

14:30-14:45 Micromechanical motivated analysis of the behavior of arterial wall #5339
Gal deBotton, Ilia Hariton and Esteban A. Socolsky; Dept. of Mechanical Engineering, Ben-Gurion Univ., Beer-Sheva, Israel

14:45-15:00 Mechanical Characterization of Arteries: Comparison of Square and Cruciform Biaxial Tests Using Inverse Modeling Technique #5210
Jorge Octavio Virues Delgadillo a,b, Sebastien Delorme c, Savvas G. Hatzikiriakos b; a Industrial Materials Institute, CNRC – NRC, Boucherville, QC, Canada; b Dept. of Chemical & Biological Engineering, UBC, Vancouver, BC, Canada

15:00-15:15 The Misuse of the Laplace Law for the Measurement of Wall Stiffness #6201
James Brasseur, Azam Thatte; The Pennsylvania State Univ., Univ. Park, USA

15:15-15:30 Biomechanics of human carotid arteries: experimental testing and material modeling
Gerhard Sommer a, Peter Regintig b, Gerhard Holzapfel c; a Royal Institute of Technology (DTH), School of Engineering Sciences, b Medical University of Graz, Institute of Pathology, c Graz University of Technology, Computational Biomechanics

16. Reproductive Biomechanics

16.3 Myometrial Contractility and Calcium Transport

Session Organizers /Chairs: Roger C Young, Anthony Shmygol

Monday, July 31
Room R 000.6

14:00-14:30 Keynote: Myocytes, myometrium and uterine contractions #5398
Roger C. Young; Dartmouth Medical Center, Obstetrics and Gynecology, Lebanon, New Hampshire, USA

14:30-14:45 In situ Ca²⁺ signalling in pregnant rat uterine smooth muscle cells #5890
Theodor Burdyga, Susan Wray; The Physiological Laboratory, Univ. of Liverpool, Liverpool, UK

14:45-15:00 Ultra-thin tissue slices – a new approach to study Ca signalling in human myometrium # 6476
A. Shmygol, A. Blanks, G. Bru-Mercier D. Spanswick and S. Thornton; The Univ. of Warwick Medical School, Coventry, UK

15:00-15:15 Mathematical model of myometrial smooth muscle contraction #5588
Limor Bursztyn a, Osnat Eytan b, Ariel J. Jafli a, David Elad a; a Dept. of Biomedical Engineering, Tel Aviv Univ., Tel Aviv, Israel; b Lis Maternity Hospital, Tel Aviv Medical Center, Tel Aviv, Israel

15:15-15:30 Interstitial Cajal-like cells in human uterus and fallopian tube #5711
Sanda M. Ciontea, D. Cretoiu, L. M. Popescu; Dept. of Cellular and Molecular Medicine, ‘Carol Davila’ Univ. of Medicine and Pharmacy, Bucharest, Romania

17. Biomechanics in Nature

17.2.2 Microorganisms

Session Organizer: Tim Pedley
Monday, July 31
Room R1.087
14:00-14:15 Circular motion of a bacterium swimming close to a rigid boundary # 4925
Tomonobu Gotoa, Yukio Magariyamab; a Dept. of Mechanical Engineering, Tottori Univ., Tottori, Japan; b Food Engineering Division, National Food Research Institute, Tsukuba, Japan
14:15-14:30 Modelling a suspension of rod-like swimmers #4389
R. J. Clarke a,b, c School of Mathematical Sciences, Univ. of Adelaide, Adelaide, SA, Australia; b Work primarily conducted as a David Crighton fellow in DAMTP, Cambridge UK
14:30-14:45 Withdrawn
14:45-15:00 Object manipulation by motion controlled Euglena group as bio-micromachines #6463
Akitoshi Itoh a, Wataru Tamurab and Tetsuro Mishimab; a Dept. of Mechanical Engineering,

18. Trends in Cranial and Spinal Biomechanics

18.3 Imaging
Session Organizers /Chairs: N. Ward, K.-J. Langen
(Incorporating papers from Thread 4: Imaging; Thread organizers: Ralph Müller, Peter Augat)
Monday, July 31
Room R2.007
14:00-14:15 Muscle dysfunction in children with spastic cerebral palsy can be quantified by abnormal patterns of myoelectric activity both within and between muscles #4575
James Wakeling a,b, Roisin Delaney b and Israel Dudkiewicz b, a The Royal Veterinary College, London, UK, b The Royal National Orthopaedic Hospital, London, UK
14:15-14:30 Functional Brain Imaging #7755
Nick Ward; National Hospital for Neurology and Neurosurgery, Institute of Neurology, Univ. College London, UK
14:30-14:45 Brain tumor imaging with [18F]fluoroethyl-L-tyrosine and PET #4327
Karl-Josef Lange a,c, Frank Floeth b, Gabriele Stoffels a,c, Guido Reifenberger c, Michael Sabel b, Kurt Hamacher d,e, Heinz H. Coenen d,e, Dirk Pauleit e,c, a Institute of Medicine, Research Center Jülich, Jülich, Germany; b Dept. of Neurosurgery, Heinrich-Heine-Univ., Düsseldorf, Germany; c Dept. of Neupathology, Heinrich-Heine-Univ., Düsseldorf, Germany; d Institute of Nuclear Chemistry, Research Center Jülich, Jülich, Germany; e Brain Imaging Center West, Research Center Jülich, Jülich, Germany
14:45-15:00 Intraoperative Functional MRI: A Novel Technology for Intraoperative Brain-Mapping #4163
Thomas Gasser c,e, Christopher Nimsky b, Oliver Ganslandt b, Erol Sandalcioglu c; Yoshihiro Muragaki d,e, Norihiko Ozawa e,c, Hiroshi Iseki d,e, Hiroshi Ujiie d, Tomokatsu Hori c, Kintomo Takakura c; Dietmar Stolk c, a Dept. of Neurosurgery, Univ. of Essen, Essen, Germany; b Dept. of Neurosurgery, Univ. of Erlangen-Nuremberg, Erlangen, Germany; c Institute of Advanced Biomedical Engineering and Science, Tokyo Women’s Medical Univ., Tokyo, Japan; d Dept. of Neurosurgery, Tokyo Women’s Medical Univ., Tokyo, Japan; e Hitachi Medical Corporation, Tokyo, Japan
15:00-15:15 Diffusion Tensor Imaging Data in Brain Tumor Surgery #6448
Gabriele Schackert a, Hagen Kitzler b, Werner Benger c, Annett Werner b, Rüdiger v. Kummer b a Dept. of Neurosurgery; and b Dept. of Neuroradiology, Univ. of Technology, Dresden, Germany; c Center for Computation & Technology at Louisiana State Univ. (CCT/LSU), Baton Rouge, Lousiana,USA

20. Biomechanics of Organs

20.1.2.2 Biomechanics and Cell and Tissue Engineering of the Anterior Segment
Session Organizers: Darryl Overby, Jeffrey Ruberti
Monday, July 31
Room R1.008
14:00-14:15 Mathematical modeling of aqueous humor flow in the eye #5327
A. A. Stein, I. N. Moiseeva, G. A. Lyubimov; Institute of Mechanics, Moscow Univ., Moscow, Russia

14:15-14:30 Biomechanical Testing of Human Trabecular Meshwork Cells and Schlemm’s Canal Endothelial Cells #5416
Taras Juzkiwa, Darren W. H. Chanb, Weijia Daiab, C. Ross Ethierbc; aMechanical and Industrial Engineering, bInstitute of Biomaterials and Biomedical Engineering and cOphthalmology, Univ. of Toronto, Toronto, ON, Canada; cvisiting scholar from Xuanwu Hospital, Capital Univ. of Medical Sciences, China

14:30-14:45 The Influence of Refractive Surgery-Induced Modulation of Corneal Biomechanics on Corneal Swelling Response #6329
Deborah M. Grzybowski, Nicholas Rogers, Richard Lembach, Cynthia Roberts Ophthalmology, The Ohio State Univ., Columbus, Ohio, USA

14:45-15:00 Three-dimensional stress as a signaling tool for developing a tissue engineered cornea # 7153
Ajay Shaha, Andrew Voorheese, Elizabeth Orwinb; Depts. of Engineeringa and Biologyb, Harvey Mudd College, Claremont, California, USA

15:00-15:15 Modeling the human cornea – mapping the corneal collagen fibril architecture based on X-ray diffraction measurements #5432
P.M. Pinskyb, D. van der Heidie, D. Chernyakb, K.M. Meekc and C.Boote; bStanford Univ., Stanford, CA, USA, cAMO Inc., Santa Clara, CA, USA, cCardiff Univ., Cardiff, UK

15:15-15:30 Creep properties of Descemet’s membrane and lens capsule following enzymatic digestion of glycosaminoglycans #6559
Carl Christian Danielsen, Dept. of Connective Tissue Biology, Institute of Anatomy, Univ. of Aarhus, Denmark

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.1.3 Computational Modelling and Mechanobiology of Cells
Session Organizers /Chairs: Gerhard A. Holzapfel, Dimitrije Stamenovic
Monday, July 31
Room R1.006

14:00-14:15 Coupling calcium wave propagation to anisotropic contraction in a multi-scale model of cardiac myocyte #4252
P. Tracqui, J. Ohayon ; Lab. TIMC/DynaCell, CNRS UMR 5525, IN3S, Faculté de médecine, La Tronche Cedex, France

14:15-14:30 Molecular Origins of Airway Closure: Multiscale Model of Hyperresponsiveness in Asthmatics #5895
Mijailovich, S.M.; Harvard School of Public Health, Boston, USA

14:30-14:45 Multiscale network modeling of the dynamic nonlinear properties of airway smooth muscle tissue #5961
Bela Suki, Satoru Ito, Arnab Majumdar; Dept. of Biomedical Engineering, Boston Univ., Boston, MA, USA

14:45-15:00 Mechanical stress dominates cell growth pattern #5199
Bin Li, Fang Li, James H-C. Wang; MechanoBiology Laboratory, Dept. of Orthopaedic Surgery, Univ. of Pittsburgh, USA

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.15.3 Cerebro-vascular Flow Modeling
Session Organizer: Timothy David
Monday, July 31
Room R1.002

14:00-14:30 Keynote: Patient Specific Numerical Hemodynamics in the Cerebral Vasculature #4647
Stephen Moore, Tim David; Centre for Bioengineering, Univ. of Canterbury, Christchurch, NZ, USA

14:30-14:45 Numerical study of blood flow in the arteries in Circle of Willis on patients with carotid artery stenosis #5763
Rinaldo V, Long Q,b, König CS, Das S, Collins MW, Pinelli Md; aBrunel Institute for Bioengeneering, bSchool of Engineering and Design, Brunel Univ., Uxbridge, Middlesex,
14:45-15:00  
**Influence of siphon bends on the flow patterns of the internal carotid artery: implications for the study of aneurysm development #7339**  
Marina Piccinelli\(^{a}\), Edoardo Boccardi\(^{b}\), Susanna Bacigaluppi\(^{c}\), Alessandro Venezani\(^{d}\), Bogdan Ene-Iordache\(^{a}\), Andrea Remuzzi\(^{a}\), Luca Antiga\(^{a}\), \(^{a}\) Bioengineering Dept., Mario Negri Institute, Bergamo, Italy; \(^{b}\) Dept. of Neuroradiology, Niguarda-Ca’ Granda Hospital, Milano, Italy; \(^{c}\) Univ. of Milan, Neurosurgery, Ospedale Maggiore Policlinico-Fondazione IRCCS, Milano, Italy; \(^{d}\) MOX, Politecnico di Milano, Milano, Italy

15:00-15:15  
**Representation of various clinical scenarios using 1-D Mathematical Model of Autoregulation #4905**  
Samara Alzaidi, Tim David, Jade Arnold; Centre for Bioengineering, Univ. of Canterbury, Christchurch, New Zealand

15:15-15:30  
**Stenting for the treatment of cerebral aneurysm #5917**  
Hui Meng\(^{a,b,c}\), Minsuok Kim\(^{a,b}\), Yiemeng Hoia\(^{a,b}\), Dale Taulbee\(^{b}\), Scott Woodward\(^{a,b}\), L. Nelson Hopkins\(^{a}\), Toshiba Stroke Research Center, \(^{b}\) Dept. of Mechanical and Aerospace Engineering, \(^{c}\) Dept. of Neurosurgery, State Univ. of New York at Buffalo, Buffalo, USA

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**Thread 1: Computational Methods in Biomechanics and Mechanobiology**

**T1.16.2 Computational Methods for Modeling of Hearing**

**Session Organizers:** Karl Grosh, Edward Givelberg  
**Chair:** Edward Givelberg  
**Monday, July 31**  
**Room R1.007**

14:00-14:15  
**A multi-compartment cochlear model with piezo-electric outer hair cells: Methods and results #7015**  
Allyn Hubbard\(^{a,b,c}\), John Spisak, Shan Lu\(^{a,b,c}\), David Mountain\(^{a,b,c}\); Boston Univ., \(^{a}\) Dept. of Electrical, Computer, and Systems Engineering, \(^{b}\) Dept. of Biomedical Engineering, \(^{c}\) Center for Hearing Research, Boston, USA

14:15-14:30  
**EarLab: A modular approach to auditory simulation #6781**  
David C. Mountain\(^{a}\), David A. Anderson\(^{a}\), Glenn J. Bresnahan\(^{b}\), Socrates G. Deligeorges\(^{a}\), Allyn E. Hubbard\(^{a}\), and Viktor Vajda\(^{a}\); Boston Univ. Hearing Research Center, Boston, MA, USA; \(^{b}\) Boston Univ. Scientific Computing and Visualization Group, Boston, MA, USA

14:30-14:45  
**Distributed Immersed Boundary Simulations #6778**  
E. Givelberg; Fluid Systems Research Corp., Nashville, USA

14:45-15:15  
**Keynote: Use of a high-level language in high performance biomechanics simulations #7071**  
Katherine Yelick\(^{a,b}\), Armando Solar-Lezama\(^{a}\), Jimmy Su\(^{a}\), Dan Bonachea\(^{a}\), Amir Kamil\(^{a}\)  
\(^{a}\) Univ. of California, Berkeley, California, USA; \(^{b}\) Lawrence Berkeley National Laboratory, Berkeley, California, USA

**Monday, July 31**  
**16:00-17:30**

**2 Musculoskeletal Mechanics-Joint ISB Track**
2.2.1 Disc Mechanics (Mechanobiology of IVD)
Session Organizers /Chairs: Lori Setton
Monday, July 31
Room R1.049

16:00-16:15  Perfusion block results in decreased diffusion into ovine lumbar intervertebral discs
#4846
Marije J. van der Werf¹, Floor Lambersb, Patrick Lezuoa, Otto Maissen⁴, Keita Ito⁴b⁹
²AO Research Institute, Davos, Switzerland; ³Dept. of Biomed. Eng., Eindhoven Univ. of Tech., The Netherlands

16:15-16:30  Establishment of an intervertebral disc whole-organ culture model with intact endplates
#6589
Daniel Haschtmann, Jivko V. Stoyanov, Ladina Ettinger, Stephen J. Ferguson
MEM Research Center, Univ. of Bern, Bern, Switzerland

16:30-16:45  Effect of limited nutrition on intervertebral disc health: an in vitro investigation on whole
organ disc explants with endplates # 5883
Benjamin Gantenbein⁻¹, Svenja Jünger⁵, Thijs Grünhagen⁶, Cynthia R. Lee⁶, Corrinus C. van
Donkelaar⁵, Mauro Alini⁷, Keita Ito⁷b, ⁸AO Research Institute, Davos, Switzerland
⁹Dept. of Biomed. Eng., Eindhoven Univ. of Tech., Eindhoven, Netherlands

16:45-16:00  Influence of diurnal hyper-osmotic loading on the metabolic activity and gene expression
of a whole-organ intervertebral disc model # 6582
Daniel Haschtmann, Jivko V. Stoyanov, Stephen J. Ferguson; MEM Research Center,
Univ. of Bern, Bern, Switzerland

17:00-17:15  Static Compression Modulates Gene Expression in the Murine Intervertebral Disc In
Vitro #6757
Lawrence M. Boyd, Mark Clapp, William J. Richardson, Devin Odom, Liufang Jing, Jun Chen
and Lori A. Setton; Dept. Biomedical Engineering and Surgery, Duke Univ., Durham,
North Carolina, USA

17:15-17:30  Mechanical stimulation alters pleiotrophin expression of IVD cells and influences
endothelial cell migration by conditioned media #5011
C. Neidlinger-Wilke⁵, K. Würtz⁵, A. Liedert⁵, J. Klase⁵, A. Ignatius⁶, L. Claes⁶, W.E.B.
Johnson⁶, S Roberts⁶; ⁵Institute of Orthopaedic Research and Biomechanics, Univ. of
Ulm, ⁶Neurosurgical Dept., Univ. of Ulm/Günzburg, Germany, ⁷RJAH Orthopaedic
Hospital, Oswestry, UK.

2 Musculoskeletal Mechanics-Joint ISB Track
2.8.4 Tendon to Bone Healing and Graft Remodeling
Session Organizers /Chairs: Savio L.Y. Woo, Richard E. Debski, Steve Abramowitch
Monday, July 31
Room R1.004

16:00-16:15  The role of the stress environment on the development of the tendon to bone insertion site
#6159
Stavros Thomopoulos ⁶, Rosalina Das ⁷, Victor Birman ⁸, Hyun-Min Kim ⁷, Stefan Rothermich
⁷, Leesa Galatz ⁶, Guy Genin ⁷; ⁶Dept. of Orthopaedic Surgery, Washington Univ., Saint
Louis, MO, USA; ⁷Engineering Education Center, Univ. of Missouri – Rolla, Saint
Louis, MO, USA

16:15-16:30  Dynamic Imaging and Analysis of Tendon Stretching at Fascicle, Fibril, and Cellular
Scales #7712
Todd C. Doehring, Chung Park; School of Biomedical Engineering and Health Systems,
Drexel Univ., Philadelphia PA, USA

16:30-16:45  Structure-Function Relationship at the Soft Tissue-Bone Interface #7589
Lu HH, Moffat KL, Spalazzi JP and Wang IE; Biomaterials and Interface Tissue Engineering
Laboratory, Columbia Univ., New York NY USA

16:45-16:00  Mechanical and biological differences between auto- and allograft ACL reconstructions
during graft remodeling and incorporation #6143
Scheffler, SU; Unterhauser, FN; Weiler, A; Sports Traumatology & Arthroscopy Service,
Centre for Musculoskeletal Surgery, Charité, Univ. Medicine Berlin, Germany

17:00-17:15  Revascularization in the tendon graft following anterior cruciate ligament reconstruction
of the knee: It mechanism and regulation #4149
3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.1.3.2 Multiple Joints
Session Organizer/Chair: F. U. Niethard
Monday, July 31
Room R 1.046
16:00-16:15 Robot based method for the analysis of an arbitrary, but repeatable upper extremity movement # 7204
N. Popovic, G. Rau, T. Schmitz-Rode, C. Disselhorst-Klug; Helmholtz-Institute for Biomedical Engineering, Chair for Applied Medical Engineering, Aachen Univ., Germany
16:15-16:30 Upper extremity movement and muscular co-ordination in children with plexuslesion #7202
F. Heinze, L. Meinecke, J. Bahn, G. Rau, T. Schmitz-Rode, C. Disselhorst-Klug; Helmholtz-Institute, Chair of Applied Medical Engineering, Aachen, Germany; St. Franziskus Hospital; Aachen, Germany
16:30-16:45 Biomechanical requirements in upper-limb orthoses for tremor suppression #5106
Juan-Manuel Belda-Lois, Ricard Barberà, Juan Gómez, José-María Baydal, José Navarro, Sonia Gimeno, Carlos Soler, Pedro Vera; Instituto de Biomecánica de Valencia, Valencia, Spain
16:45-17:00 Moved to Poster Session
17:00-17:15 A new technique for evaluation of standing posture using a tilting platform and geometric models of ROM (range of motion) #4102
Nobuharu Suzuki, Ayako Satonaka, Yasushi Itoh, Katsumi Mita, Kumi Akata, Makoto Watake; Institute for Developmental Research, Aichi Human Service Center, Aichi, Japan; Dept. of Health Informations, Kawasaki Univ. of Meical Welfare, Okayama, Japan; Dept. of Biomedical Engineering, Osaka Electro-Communicaiton Univ., Osaka, Japan; Dept. of Technology, Hokkaido Univ. of Education, Hokkaido, Japan

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.1.4.4 Upper Extremity
Session Organizers: Franz van der Helm, C. Disselhorst-Klug
Monday, July 31
Room R2.091
16:00-16:15 Deltoid mechanics in the cuff deficient shoulder # 4047
Emmanuel A. Audenaert, Lieven De Wilde, Amaryllis Audenaert, René Verdonk; Dept. of Orthopedic Surgery, Physical Medicine and Rehabilitation, Ghent Univ. Hospital, Ghent, Belgium; Dept. of environment, technology and technology management, UFSIA-UA, Antwerpen, Belgium.
16:15-16:30 A rectification algorithm for the estimation of instantaneous helical axes #6785
Jianxin XU, Wei WANG, Barry P. PEREIRA, Sook Yee CHONG; Dept of Electrical and Computer Engineering, Dept of Orthopaedic Surgery, National Univ. of Singapore, Singapore
16:30-16:45development of measurement system of contact pressure distribution in human small joint #7317
Junpei Narita, Kazuhiro Sasagawa, Hiroshi Miyata and Satoshi Toh; "Graduate School of Science and Technology, Hirosaki Univ., Hirosaki, Japan; "Faculty of Science and Technology, Hirosaki Univ., Hirosaki, Japan; "Dept. of Orthopaedic Surgery, Hirosaki Univ., Hirosaki, Japan" 16:45-16:00 determining the optimal axis of the radius about the ulna in vivo #4956
Sook-Yee CHONG, Barry PEREIRA, Wei WANG, Jianxin XU, Jeffrey K-S LOW, Yuhaim EUSOPE, Tan-Lei LAI; "Musculoskeletal Research Laboratories, Dept of Orthopaedic Surgery, "Dept of Electrical and Computer Engineering, National Univ. of Singapore, SINGAPORE"
17:00-17:15 3d in vivo arthrokinematics of the ulnohumeral joint with active pronation-supination #6487
Baeyens Jean-Pierre, Van Daele Ulrike, Goossens Maggy, Van Glabbeek Francis, Cattrysse Erik, Van Roy Peter; "Dep Experimental Anatomy-Vrije Universiteit Brussel, Belgium; "Dep Health Care Sciences-Hogeschool Antwerpen, Belgium; "Dep Engineering Sciences-Hogeschool Antwerpen, Belgium; "Dep Orthopaedic Surgery-Universiteit Antwerpen, Belgium"
17:15-17:30 the influence of movement direction and handgrip orientation on the kinetics of arm cranking #6117
Michael Voigt, Jonas Haahr, Tine Madsen; "Dept. of Health Science and Technology, Center for Sensory-Motor Interaction, Aalborg Univ., Denmark"

4. implants for trauma and orthopedics-joint esb track
4.7 implantable telemetry
Session organizers: Georg Bergmann, Darryl D'Lima
Chair: Georg Bergmann
Monday, July 31
Room E.103
16:00-16:15 Instrumented orthopaedic implants – An overview #5940
G. Bergmann, F. Graichen, A. Rohlmann, A. Bender, P. Westerhoff, U. Gabel, B. Heinlein Biomechanics Laboratory, Charité, Berlin, Germany
16:15-16:30 In Vivo Measurement of Knee Forces: Current Status and Future Directions # 7132
Darryl D'Lima, Shiley, Center for Orthopaedic Research and Education at Scripps Clinic, La Jolla, CA
16:30-16:45 Calibration techniques for a 5 DOF force-measuring telemetric total knee prosthesis #4109
Stephen JG Taylor, Rui Guimaraes, Gordon W Blunn, Centre for Biomedical Engineering, Institute of Orthopaedics and Musculoskeletal Science, Univ. College London, Stanmore, U.K.
16:45-16:00 Accuracy considerations for an instrumented tibial baseplate #6304
Bernd Heinlein, Antonius Rohlmann, Friedmar Graichen, Georg Bergmann Charité – Univeristätsmedizin Berlin, Campus Benjamin Franklin, Biomechanics Lab., biomechanik.de, Berlin, Germany
17:00-17:15 Calibration and design improvement of load sensing orthopaedic implants #4415
Georg Bergmann, Friedmar Graichen, Alwina Bender, Antonius Rohlmann, Peter Westerhoff, Bernd Heinlein, Biomechanics Lab., biomechanik.de, Charité, CBF, Berlin, Germany
17:15-17:30 An inductive control interface for force-measuring telemetric implants #7397
Stephen JG Taylor, C Robles, GW Blunn; Centre for Biomedical Engineering, Institute of Orthopaedics and Musculoskeletal Science, Univ. College London, Stanmore, UK

5. occupational and impact injury biomechanics
5.2.3 whiplash and neck injury biomechanics
Session organizers /Chairs: Brian Stemper, Beth Winkelstein
Monday, July 31
Room R0.058
16:00-16:15 In vivo facet capsule failure in a rat model: Implications for whiplash & facet-mediated neck pain #4489
5. Occupational and Impact Injury Biomechanics

5.11 Occupational Disorders, Repetitive Strain Injury

Session Organizers / Chairs: Alberto King, Hans-Joachim Wilke

Monday, July 31

Room R0.003

16:00-16:15 Tracking slow-time-scale changes in human locomotion #5392
Jonathan B. Dingwell a, Domenic F. Napolitano b and David Chelidze b, a Nonlinear Biodynamics Lab, Dept. of Kinesiology, Univ. of Texas, Austin, TX, USA
b Dept. of Mechanical Engineering, Univ. of Rhode Island, Kingston, RI, USA

16:15-16:30 Analysis of mechanical stimuli on mechanoreceptors in a fingertip exposed to vibrations #4359
John Z. Wu, Kristine Krajnak, Daniel E. Welcome, and Ren G. Dong; National Institute for Occupational Safety and Health, Morgantown, WV, USA

16:30-16:45 Micromotion identification, isolation and associated loading #6752
Anne Moore a, Ian Kudrykb; a School of Kinesiology and Health Science, York Univ., Toronto, Canada; b School of Physical and Health Education, Queen’s Univ., Kingston, Canada

16:45-17:00 Prevention of the bad vibration influence on a forklift driver based on vibration measurements #4737
Zorica Srdjevic a and Livija Cveticanib; a Faculty of Agriculture, Univ. of Novi Sad, Serbia and Montenegro; b Faculty of Technical Sciences, Univ. of Novi Sad, Serbia and Montenegro

17:00-17:15 Anatomy-based human models for the simulation of whole-body vibration injuries #6282
Sebastian Rützel, Horst Peter Wölfel; Darmstadt Univ. of Technology, Dept. of Structural Dynamics, Darmstadt, Germany

17:15-17:30 The static and dynamic lifting capacity in patients with chronic low back pain #4684
Yang Hua Lin, Ming Hui Sun; Graduate Institute of Rehabilitation Science, College of Medicine, Chang Gung Univ., Taoyuan, Taiwan.

6. Sport Biomechanics-Joint ISB Track

6.1.2. Functional Anatomy

Session Organizers: Albert Gollhofer, Janne Avela

Monday, July 31

Room D2.12

16:00-16:15 A Biomechanical Analysis Of Human Calcaneal Loads in Drop Jumping #6874
Syn Schmitt a, Arno Grunendahl b, Frank Mayer c, Albert Gollhofer c, a Dept of Sports Science, Univ. of Freiburg, Freiburg, Germany; b TNO Automotive Germany GmbH, Stuttgart, Germany; c Departement of Sports Medicine, Univ. of Potsdam, Potsdam, Germany

16:15-16:30 Geometric Predictors for Stress Fractures and MTSS in Aerobic Athletes #7714
Melanie Franklyn, Barry Oakes, David Morgan and Bruce Field; “Centre for Biomedical Engineering, Monash Univ., Victoria, Australia; b Dept. of Anatomy and Cell Biology, Monash Univ., Victoria, Australia; c Mechanical Engineering Dept., Monash Univ., Victoria, Australia

16:30-16:45 Knee pathology classification using the instantaneous screws parameter and Support Vector Machines classifier #5013
Alon Wolf, Amir Degani, Dept. of Mechanical Engineering, Technion – Israel Institute of Technology, Haifa, Israel; b Robotics Institute, Carnegie Mellon Univ., Pittsburgh, PA, USA

6. Sport Biomechanics–Joint ISB Track
6.10.2 Vibration Load in Sport Application of Vibration in Exercise
Session Organizers /Chairs: Joachim Mester, Peter Spitzenpfeil
Monday, July 31
Room R 1.003

16:00-16:30 Keynote: Vibration load: A multi-effect systemic stimulus? #5395
Joachim Mester; Institute of Training Science and Sport-Informatics, German Sport Univ. Cologne, Germany

16:30-16:45 The potential of vibration training to affect the response of muscle, bone and cartilage during short term bed rest #5953
Anna-Maria Liphardt, Natalie Bäcker, Annegret Mündermann, Seunghun Koo, Thomas Andricchi, Jochen Zange, Martina Heer; a DLR-Institute of Aerospace Medicine, Cologne, Germany; b Dept. of Mechanical Engineering, Stanford Univ., Stanford, CA, USA; c German Sport Univ. Cologne, Cologne, Germany

16:45-16:00 Mechanical impacts to the human body by different vibration training devices #5931
Peter Spitzenpfeil, Martin Stritzker, Alexander Kirchbichler, Ferdinand Tüsker, Ulrich Hartmann, Manfred Hartard; Faculty of Sport Science, Technical Univ. of Munich, Munich Germany

17:00-17:15 Short-term effects of vibration stimuli during intensive cycling performance on angiogenesis #5174
Frank Suhr, Markus de Marées, Joachim Mester; Institute of Training Science and Sport Informatics, German Sport Univ. Cologne, Cologne, Germany

17:15-17:30 The effect on coefficient of restitution and vibratory conduction of tennis racket arranged in one-piece molded and pu-foam handles #7074
Ti-Yu Chen, Chung-Yu Chen, Jinn-Yen Chiang; a Dept. of Physical Education, National Changhua University of Education, Changhua, Taiwan; b Dept. of Physical Education, National Taiwan College of Physical Education, Taichung, Taiwan

9. Tissue Engineering
9.1.3 Model/Bioreacter/Animal Experiments
Session Organizers: Christian Oddou, Alicia el-Haj
Chairs: Axel Stemberger, R. Bizios
Monday, July 31
Room R1.005

16:00-16:30 Keynote: Challenges for Tissue Engineering Applications in Tissue Repair #7775
Rena Bizios; Dept. of Biomedical Engineering, The Univ. of Texas at San Antonio, San Antonio, Texas, USA

16:30-16:45 Cellular Dynamics in Bone Formation. A Biomaterial Based Model #7453
Toom Alar, Suutre Siim, Arend Andres, Märtson Aare; Tartu Univ., Clinic of Traumatology and Orthopaedics, Tartu, Estonia; b Tartu Univ., Dept. of Anatomy, Tartu, Estonia

16:45-16:00 Temporal analysis of mechanical properties of skeletal tissue regeneration. An experimental study #4776
Didier Moukoko, Martine Pthioux, Patrick Chabrand; Laboratory of Aerodynamics and Biomechanics of Motion, Marseilles, France

17:00-17:15 Bone healing by non-viral BMP-2 gene transfer – a novel vector release out of a mechanically stable PDLLA-coating of metallic surfaces #7723
10. Cellular and Molecular Mechanics

10.2.1 Cell Mechanics

Session Organizer /Chair: Ben Fabry

Monday, July 31
Room R0.056

16:00-16:15 The Actin Crosslinker Filamin Plays a Key Role in the Nonlinear Mechanical Response of Living Cells #4915
Karen Kasza, Fumihiko Nakamura, Shaohua Hu, Thomas Stossel, Ning Wang, David Weitz
Division of Engineering and Applied Science, Harvard Univ., Cambridge, MA, USA; Hematology Division, Brigham and Women’s Hospital, Boston, MA, USA

16:15-16:30 Mechanically induced effects on the cytoskeleton of epithelial cells #7079
Sylvie Hénon, Delphine Icard, Martial Ballard, François Gallet; Matière et Systèmes Complexes, UMR 7057 CNRS Université Paris 7, Paris, France

16:30-16:45 Passive and active mechanical properties of a single C2.7 cell #7518
A. Guiroy, N. Desprat, A. Richert, A. Asnacios; Laboratoire Matière et Systèmes Complexes, UMR 7057 CNRS UMR 7057, Paris, France

16:45-16:00 Force fluctuation and micro rheology in endothelial cells # 5699
Daniel Paranhos Zitterbart, Carina Raupach, Claudia T. Mierke, Claus Metzner, Ben Fabry
Center for Medical Physics and Technology, Biophysics Group, Friedrich-Alexander Univ. of Erlangen-Nuremberg, Germany

17:00-17:15 Microrheology And Force Traction Of Mechanosensitive Bone Cells #5945
Dept Oral Cell Biology, ACTA-Vrije Universiteit, Amsterdam, The Netherlands; Dept Physics, Vrije Universiteit, Amsterdam, The Netherlands; Dept Physics and Medical Technology, VU Med Center, Amsterdam, The Netherlands; Dutch Experiment Support Center, Vrije Universiteit, Amsterdam, The Netherlands

17:15-17:30 Nuclear Plasticity - Mechanical and Supramolecular insights into the Genome #6930
David Pajerowski, Kris Noel Dahl, and Dennis E. Discher
Biophysical Engineering Lab, Univ. of Pennsylvania; Philadelphia, PA, USA

14. Cardiovascular Mechanics

14.10.1 Large Vessel Fluid Mechanics-Implants and Devices

Session Organizers: Hans-Henning Eckstein, Hermann Berger

Monday, July 31
Room G0.01

16:00-16:15 Flow alterations caused by cerebral protection devices during carotid angioplasty. A fluid dynamics study in a carotid artery model # 7807
Diagnostic and Interventional Radiology, Technical Univ. of Munich, Munich, Germany; Vascular Surgery, Technical Univ. of Munich, Munich, Germany; Laboratory of Biofluidmechanics, Univ. of Applied Science Munich, Munich, Germany

16:15-16:30 Stent placement in an elongated carotid artery: correlation of experimental flow alterations and clinical outcome # 7808
O. Greil, C. Gruber, W. Weiss, O. Wolf, P. Heider, D. Liepsch, H. Berger
Diagnostic and Interventional Radiology, Technical Univ. of Munich, Munich, Germany; Dept. of Vascular Surgery, Technical Univ. of Munich, Munich, Germany; Univ. of Applied Science, Laboratory of Biofluidmechanics, Munich, Germany
14. Cardiovascular Mechanics
14.13.4 Vascular Wall Mechanics -Active Behavior of Arterial Walls
Session Organizers/Chairs: Gerhard Holzapfel, Takeo Matsumoto
Monday, July 31
Room G1.27
16:00-16:30 Keynote: Ventral-dorsal difference in active contractile response of rabbit thoracic aortas: Correlation with local compliance #4169
Takeo Matsumoto, Takahiro Shirono, Makoto Ohoka, Kazuaki Nagayama
Biomech Lab, Dept Mech Engng, Nagoya Inst Tech, Nagoya, Japan
16:30-16:45 First approximation of the zero-stress state of arterial wall and contraction of SMC #4388
Guo-Qiang WU, Li WANG, Ji-Bin XIN, Wen-Zhou LIN; "Dept. of Mechanics and Engineering Science, School of Life Science, Fudan Univ., Shanghai, China
16:45-16:00 Tensegrity FE models of mechanical tests of individual cells #4803
Jiri Bursa, Radek Lebis; Inst. of Solid Mechanics, Mechatronics and Biomechanics, Brno Univ. of Technology, Brno, Czech Rep.
17:00-17:15 The Mechanics of Arteries Including Smooth Muscle Contraction #5567
Jonas Stålhand, Anders Klarbring, Gerhard A. Holzapfel; "Linköping Univ., Linköping, Sweden; "Royal Institute of Technology, Stockholm, Sweden
17:15-17:30 A structural model for the arterial wall including scleroprotein and vascular smooth muscle interaction #6588
S. Roy, D. Miteva, G. Prod’hom, P. Silacci and N. Stergiopulos; Ecole Polytechnique Fédérale de Lausanne, Hemodynamics and Cardiovascular Technology Laboratory, Lausanne, Switzerland

16. Reproductive Biomechanics
16.4 Mechanics of the Uterus and Cervix in Pregnancy
Session Organizers/Chairs: Simona Socrate, Michelle Oyen
Monday, July 31
Room R006
16:00-16:30 Keynote: The cervical function in pregnancy #7586
Simona Socrate, Anastassia P. Paskaleva, Kristin M. Myers, Michael D. House
16:30-16:45 Thickness effects on fracture properties of the placental membranes #7138
Michelle L. Oyen\textsuperscript{a}, Steve E. Calvin\textsuperscript{b}; \textsuperscript{a}Center for Applied Biomechanics, Univ. of Virginia, Charlottesville, VA, USA; \textsuperscript{b}Univ. of Minnesota, Obstetrics, Gynecology, and Women's Health and Minnesota Perinatal Physicians—Allina Health System, Minneapolis, MN, USA

16:45-17:00 Biomechanics of the human chorioamnion #7572
Thibault P. Prevost\textsuperscript{a}, Subra Suresh\textsuperscript{b}, Michael D. House\textsuperscript{b}, Simona Socrate\textsuperscript{c}; \textsuperscript{a}Dept. of Material Science and Engineering, Massachusetts Institute of Technology, Cambridge, MA, USA; \textsuperscript{b}Division of Maternal Fetal Medicine, Tufts-New England Medical Center, Boston, MA, USA; \textsuperscript{c}Dept. of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, MA, USA

17:00-17:15 Analysis of cervical dynamics using ultrasound image processing #5593
Rimma Pugatsch\textsuperscript{a}, David Elad\textsuperscript{a}, Ariel J. Jaffa\textsuperscript{b}, Osnat Eytan\textsuperscript{b}; \textsuperscript{a}Dept. of Biomedical Engineering, Tel Aviv Univ., Tel Aviv, Israel; \textsuperscript{b}Lis Maternity Hospital, Tel Aviv Sourasky Medical Center, Tel Aviv, Israel

17:15-17:30 In vivo characterization of the mechanics of human uterine cervixes #7152
Margit Bauer\textsuperscript{a}, Edoardo Mazza\textsuperscript{a}, Alessandro Nava\textsuperscript{b}, Michael Bajka\textsuperscript{b}, Uwe Lang\textsuperscript{a}, Gerhard A. Holzapfel\textsuperscript{a}; \textsuperscript{a}Medical University Graz, Department of Obstetrics and Gynecology, Graz, Austria; \textsuperscript{b}Swiss Federal Institute of Technology, Department of Mechanical Engineering, Zurich, Switzerland; \textsuperscript{c}University Hospital Zurich, Department of Obstetrics and Gynecology, Zurich, Switzerland; \textsuperscript{d}Graz University of Technology, Computational Biomechanics, Graz, Austria; \textsuperscript{e}Royal Institute of Technology, School of Engineering Sciences, Stockholm, Sweden

17. Biomechanics in Nature
17.3.1 Plant Biomechanics
Session Organizers /Chairs: Roland Ennos, Olga Speck
Monday, July 31
Room R1.087

16:00-16:15 The mechanical design of wood cell walls #4134
Ingo Burgert, Notburga Gierlinger, Michaela Eder, Peter Fratzl; Max-Planck-Institute of Colloids and Interfaces, Dept. of Biomaterials, Research Campus Golm, Potsdam, Germany

16:15-16:30 Universal morphological patterns in wood: Micromechanics-based prediction of anisotropic strength from composition and microstructure #6737
K. Hofstetter, Ch. Hellmich, J. Eberhardsteiner; Institute for Mechanics of Materials and Structures, Vienna Univ. of Technology, Vienna, Austria

16:30-16:45 Following Molecular Deformation in Cellulose Using Raman Spectroscopy: A Tool for Plant Tissue Mechanical Characterisation #6959
S. J. Eichhorn; Materials Science Centre, School of Materials, Univ. of Manchester, Manchester, UK

16:45-17:00 Mathematical modelling of the elongation zone formation in the plant roots #5329
A. A. Stein, S. A. Logvenkov; Institute of Mechanics, Moscow Univ., Moscow, Russia

17:00-17:15 Identification of rheological parameters of the models of growing biological continuous media #4323
Natalya Kizilova; Dept. of Theoretical Mechanics, Kharkov National Univ., Kharkov, Ukraine

17:15-17:30 Geometrically accurate biological flow simulation: applications to pine cone pollination and graptolite hydrodynamics #4978
G. Tabor\textsuperscript{a}, P.G. Young\textsuperscript{a}, J.E. Cresswell\textsuperscript{b}, S. Rigby\textsuperscript{b}; \textsuperscript{a}Univ. of Exeter, UK; \textsuperscript{b}Univ. of Edinburgh, UK

18. Trends in Cranial and Spinal Biomechanics
18.4 Robotics
Session Organizers/Chairs: H. Iseki, C. Nimsy
Monday, July 31  
Room R.2007

16:00-16:15  Experience with robot guided endoscopy - mechatronic assisting systems for the 
neurosurgical operating theatre  #4609  
\textsuperscript{a}Nimsky C, \textsuperscript{b}Rachinger J, \textsuperscript{b}Bumm K, \textsuperscript{b}Iro H, \textsuperscript{b}Buchfelder M; \textsuperscript{b}Dept. of Neurosurgery, \textsuperscript{b}Dept. of 
Otorhinolaryngology, Head and Neck Surgery, Univ. of Erlangen-Nuremberg, Erlangen, 
Germany

16:15-16:30  Experience with Cyberknife\textsuperscript{TM}  #5675  
Alexander Muacevic\textsuperscript{a}, Christian Drexler\textsuperscript{a}, Joerg-Christian Tonn\textsuperscript{b}, Berndt Worr\textsuperscript{a}  
\textsuperscript{a}European Cyberknife Center Munich, Munich, Germany; \textsuperscript{b}Dept. of Neurosurgery, 
Univ. Hospital Munich Grosshadern, Munich, Germany

16:30-16:45  Robotics Technology to Characterize Changes in 3D Joint Kinematics after Treatment  
#6601  
Wafa Tawackoli and Michael AK Liebschner; Dept. of Bioengineering, Rice Univ., 
Houston, Texas, USA

16:45-17:00  Approach for Maxillofacial Reconstructions Based on Reverse Engineering and Rapid 
Prototyping  #5841  
\textsuperscript{a}Kalaidjjeva, M., \textsuperscript{b}Polihronov, P., \textsuperscript{c}Tosheva, E., \textsuperscript{c}Hieu, L.C., \textsuperscript{c}Toshev. Y.; \textsuperscript{c}Institute of 
Mechanics and Biomechanics, Bulgarian Academy of Sciences, Sofia, Bulgaria; \textsuperscript{b}Maxillofacial 
Surgery Hospital, Sofia, Bulgaria; \textsuperscript{c}School of Engineering, Cardiff Univ., Cardiff, UK

17:00-17:15  Biomechanics of the cervical spine after fusion and arthroplasty  #5021  
\textsuperscript{a}Fabio Galbusera, \textsuperscript{b}Manuela T. Raimondi, \textsuperscript{b}Marco Sassi, \textsuperscript{b}Maurizio Fornari, and  
\textsuperscript{c}Roberto Assietti; \textsuperscript{b}Laboratory of Biological Structure Mechanics, Dept. of 
Structural Engineering, Politecnico di Milano, Milan, Italy; \textsuperscript{b}Dept. of Neurosurgery, Istituto 
Ortopedico Galeazzi, Milan, Italy; \textsuperscript{c}Dept. of Neurosurgery, Ospedale Fatebenefratelli e 
Oftalmico, Milan, Italy

20. Biomechanics of Organs 
20.2 Ears 
Session Organizer: Mark Johnson

Monday, July 31  
Room R.1008

16:00-16:15  Biomechanical simulation of middle ear using hyperelastic models  #6035  
F Gentil\textsuperscript{a}, RM Natal Jorge\textsuperscript{b}, AJM Ferreira\textsuperscript{a}, MPL Martins\textsuperscript{b}, E Almeida\textsuperscript{a}  
\textsuperscript{a}Escola Superior de Tecnologia da Saúde do Porto, Clinica ORL, Widex, Portugal  
\textsuperscript{b}IDMEC-Polo FEUP, Faculdade de Engenharia, INEGI, Faculdade de Engenharia, 
Universidade do Porto, Portugal

16:15-16:30  Biomechanics of Otitis Media with Effusion in Human Ear  #6672  
Rong Z. Gan, Chenkai Dai, and Xuelin Wang; School of Aerospace and Mechanical 
Engineering and Bioengineering Center, Univ. of Oklahoma, Norman, Oklahoma, USA

16:30-16:45  Calculation of the strain-stress state of the reconstructed middle ear after inserting a 
malleus-incus prosthesis  #4693  
Gennadi Mikhailsev\textsuperscript{a}, Sergey Ermochenko\textsuperscript{a}, Matthias Bornitz\textsuperscript{b}, Edh  
Mathias Bornitz\textsuperscript{b}, \textsuperscript{c}Dept. of Mathematics, Vitebsk 
State Univ., Vitebsk, Belarus; \textsuperscript{b}HNO Clinic, Dresden Univ. of Technology, Dresden, Germany

20. Biomechanics of Organs 
20.2 Ears 
Session Organizer: Mark Johnson

Monday, July 31  
Room R.1008

16:00-16:15  Structural-Transport Finite Element Models of Drug Eluting Stents in Large Arteries  
#5258  
Bruce Simon\textsuperscript{a}, Jonathan Vande Geest\textsuperscript{a}, Paul Rigby\textsuperscript{c}, Tyler Newberg\textsuperscript{d}, Stuart Williams\textsuperscript{ab}, Syed 
Hossainy\textsuperscript{c}, Santosh Prabh\textsuperscript{b}; \textsuperscript{a}Aerospace and Mechanical Engineering \textsuperscript{b}Biomedical 
Engineering, The Univ. of Arizona, Tucson, USA; \textsuperscript{c}Titan/L-3 Communications, San 
Diego, USA; \textsuperscript{d}Raytheon Corp, Tucson, USA; \textsuperscript{e}Guidant Corp, Santa Clara, USA
16:15-16:30 A Combined Experimental/Computation Method to Study Vascular Mechanopathobiology: Computational Simulations of Ex Vivo Experiments #5827
J. Scott VanEpps, David A. Vorp; Univ. of Pittsburgh, Depts. of Surgery and Bioengineering, and McGowan Institute for Regenerative Medicine, Pittsburgh Pennsylvania, USA

16:30-16:45 3D Changes in Arterial Nanostructure during Experimental Aneurysm Growth Studied by Serial Block-Face Scanning Electron Microscopy #6513
Mary K. O’Connell, Joan M Greve, Bong-Soo Sohn, Chengpei Xu, JoAnn Buchanan, Eiketsu Sho, Winfried Denk, Christopher K. Zarins, Ronald L. Dalman, Charles A. Taylor
Depts. of *Mechanical Engineering, Bioengineering, Surgery, Molecular and Cellular Physiology, Stanford Univ., Stanford, CA, USA; Veterans Affairs Palo Alto Health Care System, Palo Alto, CA, USA; KAI Pharmaceuticals, South San Francisco, CA, USA; Max-Planck Institute for Medical Research, Heidelberg, Germany

16:45-17:00 Stress analysis in multicomponent plaque of human carotid artery models #5776
Mattiuz A, Long Q, König C, Collins MW, Pinelli M; Brunel Institute for Bioengineering, Brunel Univ., Uxbridge, Middlesex, UK; School of Engineering and Design, Brunel Univ., Uxbridge, Middlesex, UK; Dept. of Engineering, Ferrara Univ., Ferrara, Italy

17:00-17:15 A histologically based anisotropic model of the abdominal aortic aneurysm #5769
T.C. Gasser, M. Landuyt, G. Sommer, M. Auer, P. Verdonck, J. Swedenborg, G.A. Holzapfel; Royal Institute of Technology (KTH), School of Engineering Sciences, Stockholm, Sweden; Gent Univ., Dept. of Civil Engineering, Gent, Belgium
Graz Univ. of Technology, Computational Biomechanics, Schiesstattgasse 14-B, A-8010 Graz, Austria; Karolinska Univ. Hospital, Dept. of Vascular Surgery, N1:06, SE-17176 Stockholm, Sweden

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.16.3 Computational Methods for Modeling of Hearing
Session Organizers /Chairs: Karl Grosh, Edward Givelberg
Monday, July 31
Room R1.007

16:00-16:15 A model for unifying estimations of auditory difference across normal-hearing and cochlear-implant subjects #6146
J. Brandon Laflen, Thomas M. Talavage, Mario A. Svirsky
Dept. of Otolaryngology, New York Univ. School of Medicine, New York, NY, USA

16:15-16:30 Amplitude non-linearity of the electrically evoked compound action potential (eCAP) of the auditory nerve #6968
J.J. Briaire, A.A. Westen and Frijns, J.H. M.; ENT Dept., Leiden Univ. Medical Centre, Leiden, The Netherlands

16:30-16:45 Dynamic behavior of the organ of Corti includes the outer hair cell motility at the apical turn of the guinea pig cochlea: Theoretical considerations #4653
Hiroshi Wada, Chihiro Nakajima; Dept. of Bioengineering and Robotics, Tohoku Univ., Sendai, Japan

16:45-16:00 Computational modeling of in vitro and in vivo active force production by the cochlear outer hair cell #5252
Alexander A. Spector, Zhijie Liao, Aleksander S. Popel, William E. Brownell
Dept. of Biomedical Engineering, Johns Hopkins Univ., Baltimore, Maryland, USA

17:00-17:15 Asymptotic-numerical solution for cochlear model with full organ of Corti #5253
C.R. Steele, Sunil Puria, Michael J. Wittbrodt, and Yong-Jin Yoon
Mechanical Engineering, Stanford Univ., USA; Otolaryngology-Head and Neck Surgery, Stanford Univ., USA
Program overview

F. 1 Session Sport Biomechanics
Tuesday August 1, 2006
Room R0.056
08:15-09:45
Chairs: Laurence Chèze, Patrick Lacouture

- Measurement by stereophotogrammetry: analysis of displacements in the Temporo - Mandibular Joint
  M. Mesnard, A. Ballu, M. Cid & Ph. Caix

- Dynamic evaluation of swim-fins #7351
  G. Nicolas, B. Bideaua, B. Colobert, G. Le Guerroue, F. Multon, L. Baly & P. Delamarche

- Symmetry in rowing air-braked ergometers #7916
  F. Colloud, P. Bahuaud & L. Chèze

- Effect of acute cyclic stretching on the mechanical properties of the gastrocnemius medialis tendon using in vivo ultrasonography #5091
  P. Portero, O. Maisetti

F. 2 Session Biofluids and Transfers
Tuesday August 1, 2006
Room R0.056
11:00-12:30
Chairs: Olivier Boiron, Pascal Verdonck

- The human lumbar intervertebral disc: a multi-phase biological tissue approached by bio-chemo-mechanical considerations #7917
  S. Wendling-Mansuy, C. Magnier, V. Deplano, O. Boiron & P. Chabrand

- Large artery function in clinical practice #7928
  P. Segers

- Advances in continuum mechanics-based models of the arterial wall # 7927
  N. Stergiopulos

- Interaction in between biomechanics and Pr Christian Oddou
  P. Verdonck

F. 3 Session Tissues and Structures Biomechanics
Tuesday August 1, 2006
Room R0.056
14:00-15:30
Chairs: Patrick Chabrand, David Mitton
Osteogenic effects of early loading on screw-shaped endosseous implants
#7914
J. Vander Sloten
Computing models involving various time scales for cortical bone adaption
#6364
L. Rakotomanana
The EOS system: New perspectives for musculoskeletal biomechanics #7915
W. Skalli, D. Mitton, J. de Guise & J. Dubousset
Collaborative effort in France on impact biomechanics: example of study on cranial bone #7893
K. Bruyère

F. 4. Conference Awards Prix MAAF Santé de biomécanique– Prix Société de Biomécanique
Tuesday August 1, 2006
Room R0.056
16:00-17:30
Chairs: Michel Jaffrin, Régis Rieu

F. 5 General Assembly of the Société de Biomécanique
Following the Conference Awards
08:15-09:45

1. Bone Mechanics – Joint ESB Track
1.2.1 Bone Healing
Chair: Lutz Claes, Georges van der Perre
Tuesday, Aug. 1
Room R0.055

08:15-08:45 Biomechanics of fracture healing #6368
Lutz Claes; Univ. of Ulm, Institute of Orthopaedic Research and Biomechanics, Ulm, Germany

08:45-09:00 Temporary Distraction of a Diaphyseal Osteotomy accelerates Fracture Healing #4478
Claes L*, Augat P*, Ehrnhöller C*, Konrads C*, and Schorlemmer S*; *Institute of Orthopaedic Research and Biomechanics, Univ. of Ulm, Ulm, Germany; †Biomechanics Research Laboratory, Trauma Center Murnau, Murnau, Germany

09:00-09:15 Moved to Poster Session

09:15-09:30 Effect of rhBMP-2 and fixation stiffness on fracture healing: Biomechanical study #4025
José L Peris a, Mireia García-Roselló b, María D. Cuenca c, Carlos Atienza c, Amelia Gómez c, Amparo López c, Jaime Prat a, Carlos Soler c; †Institute of Biomechanics of Valencia, Valencia, Spain; ‡Prince Felipe Research Centre, Valencia, Spain; ††Cell Biology Dept., Univ. of Málaga, Spain

09:30-09:45 Increasing Fracture Callus Strength With A Single Dose Of Zoledronic Acid #4553
N. Amanat a,b, M. McDonald a, C. Godfrey a, L. Bilton b, D. Little b; †Orthopaedic Research and Biotechnology, The Children’s Hospital Westmead, Sydney, Australia; ‡School of Aerospace, Mechanical and Mechatronic Engineering, Univ. of Sydney, Australia

2 Musculoskeletal Mechanics-Joint ISB Track
2.2.2 Disc Mechanics (Mechanics of IVD)
Session Organizers /Chairs: Lori Setton, Keita Ito
Tuesday August 1
Room R1.049

08:15-08:30 Characterisation Of Intervertebral Disc Tissue And Its Substitutes #6739
J.M. Huyghe, R.W. Roos, R. Petterson, Y. Schroeder, C.J.M. Jongeneelen, L. Pel, H.P. Huinink; Dept. of Biomedical Engineering and Dept. of Physics, Eindhoven Univ. of Technology, Eindhoven, The Netherlands

08:30-08:45 Analysis of anular lesions in the L4/5 intervertebral disc: a hyperelastic model #5863
J Paige Little a, Clayton Adam a, John Evans a, Graeme Pettet b, Mark Pearcy a; a School of Engineering Systems and b School of Mathematical Science, QUT, Brisbane, Australia

08:45-09:00 On Hyperelastic Constitutive Modeling of Annulus Fibrosus #7042
F.C. Caner a, Z.Y. Guo a, B. Moran a, Z.P. Bazant a and I. Caro f; a Ramon y Cajal Researcher and Lecturer, School of Civil Eng., Technical Univ. of Catalonia, Barcelona, Spain; Visiting Scholar, Dept. of Civil & Env. Eng., Northwestern Univ., Evanston, IL, USA; b Research Associate, Dept. Of Mechanical Eng., Northwestern Univ., Evanston, IL, USA; c Dept. of Mechanical Eng., Northwestern Univ., Evanston, IL, USA; d Dept. of Civil & Env. Eng., Northwestern Univ., Evanston, IL, USA; e School of Civil Eng., Technical Univ. of Catalonia, Barcelona, Spain

09:00-09:15 Cervical intervertebral disc herniation in response to severe loading in compression and bending # 7409
P Pollintine, D Skrzypiec, P Dolan, MA Adams; Dept. of Anatomy, Univ. of Bristol, UK

09:15-09:30 Intradiscal pressures in rat tail discs measured using a miniaturized fiber-optic sensor #5507
Adam H. Hsieh a,b, David A. Ryan a,b, Zhong Chen b, Yuxiang Liu b, Silas C. Nesson b, and Miao Yu b, a Bioengineering Graduate Program, Univ. of Maryland, College Park, MD, USA; b Dept. of Mechanical Engineering, Univ. of Maryland, College Park, MD, USA

09:30-09:45 Intradiscal Pressure, Shear Strain and Fiber Strain in the Intervertebral Disc Under Combined Loading #5646
Hendrik Schmidt, Annette Kettler, Frank Heuer, Ulrich Simon, Lutz Claes, Hans-Joachim Wilke; Institute of Orthopaedic Research and Biomechanics, Univ. of Ulm, Germany

2 Musculoskeletal Mechanics-Joint ISB Track
Musculoskeletal Modelling (Cellular and Molecular muscle mechanics)
Tuesday August 1
Chairs: Maarten Bobbert, Ton van den Bogert
Room R0.002
08:15-08:30 Development of hip disarticulation prostheses using a simulator based on neuro-musculoskeletal human walking model #4228
Hisashi Naito a, Takenobu Inoue b,c, Kazunori Hase d, Takeshi Matsumoto e, and Masao Tanaka e; a Dept. of Mechanical Science and Bioengineering, Graduate School of Engineering Science, Osaka Univ., Osaka, Japan; b National Rehabilitation Center for Persons with Disabilities, Japan; c The Univ. of Tokyo, Tokyo, Japan; d Nagoya Univ., Nagoya, Japan

08:30-08:45 In Vivo Measurement of the Kinematics of Normal and ACL-Deficient Knees Using Fluoroscopy with Voxel-Based Bone Models #4668
Tsung-Yuan Tsai a, Tung-Wu Lu a, Mei-Ying Kuo a, b and Horng-Chaung Hu a; a Institute of Biomedical Engineering, National Taiwan Univ., Taipei, Taiwan; b School of Physical Therapy, China Medical Univ., Taichung, Taiwan; c Dept. of Orthopaedics, China Medical Univ. Hospital, Taichung, Taiwan

08:45-09:00 The influence of hip muscle activity on modeled hip contact forces during walking in subjects with total hip replacements #4906
Kharma C. Foucher, Markus A. Wimmer, Debra E. Hurwitz; Dept. of Orthopedic Surgery, Rush Univ. Medical Center, Chicago, IL, USA

09:00-09:15 Dependence of Tibiofemoral Load on Body Position in Two-legged Stance #5512
Kevin B. Shelburne e, Hyung-Joo Kim b, Justin W. Fernandez a, J. Erik Giphart b, Michael R. Torry a, William I. Sterett c, Marcus G. Pandy b; a Steadman-Hawkins Research Foundation, Vail, Colorado, USA; b The Univ. of Melbourne, Victoria, Australia; c Steadman-Hawkins Clinic, Vail, Colorado, USA

09:15-09:30 3-dimensional motion analysis of the rheumatic foot – development of a foot model #5577
A. Nagel, L.H. Meyer, D. Klein, D. Rosenbaum; Motion Analysis Lab, Orthopedic Dept., Univ. Hospital of Muenster, Germany

09:30-09:45 A parameterized finite element model for hip fracture prediction #5583
L.Duchemin a, D.Minton b, JD.Laredo c, W.Skalli b; a Laboratoire de Biomécanique, ENSAM - CNRS UMR 8005, Paris, France; b Laboratoire de Radiologie Expérimentale, CNRS UMR 7052, Paris, France; c Service de Radiologie Ostéo-Articulaire, Hôpital Lariboisière, Paris, France

2.8.5 Contribution of Ligaments to Joint Mechanics
Session Organizers /Chairs: Savio L.Y. Woo, Richard E. Debski, Steve Abramowitch
Tuesday August 1
Room R1.004
08:15-08:30 Effect of Tibial Plateau Angle on Knee Loads during Activity #5508
Kevin B. Shelburne, Michael R. Torry b, William I. Sterett a, b, Marcus G. Pandy c; a Steadman-Hawkins Research Foundation, Vail, Colorado, USA; b Steadman-Hawkins Clinic, Vail, Colorado, USA; c The Univ. of Melbourne, Melbourne, Victoria, AUS

08:30-08:45 The roles of single and double-bundle PCL and posterolateral corner reconstructions to restoring laxity in combined injuries #4725
S ApSingh a, T Nguyen b, A Unwin a, D Deehan b, AMJ Bull b, AA Amis a; a Newcastle Univ. Hospital, aOnehealth Knee Clinic, b Imperial College London, London, UK

08:45-09:00 The effect of ACL deficiency on knee biomechanics #6312
3. Musculoskeletal systems and Performance-Joint ISB/ESB Track

3.1.2.1 Knee

**Session Organizers:** Thomas P. Andriacchi, Fabio Catani

**Tuesday August 1**

**Room R 0.005**

08:15-08:30  **Can MR derived bone models be used for accurate motion measurement with single-plane 3D shape registration? #5988**

Taka-aki Moro-oka a,c, Satoshi Hamai d, Hiromasa Miura d, Hidehiko Higaki e, Benjamin J. Fregly b, Yukihide Iwamoto b, Scott A. Banks a,b, a Dept. of Mechanical & Aerospace Engineering, Univ. of Florida, Gainesville, FL, USA; b The BioMotion Foundation, Palm Beach, FL, USA; c Seimeikai Morooka Orthopaedic Hospital, Fukuoka, Japan; d Dept. of Orthopaedic Surgery, Graduate School of Medical Sciences, Kyushu Univ., Fukuoka, Japan; e Dept. of Mechanical Engineering, Faculty of Engineering, Kyushu Sangyo Univ., Fukuoka, Japan

08:30-08:45  **Evaluation of the elastic modulus variations in a subject-specific knee model using the drawer test #6461**

Luigi Bertozzi, Rita Stagni, Silvia Fantozzi, Angelo Cappello; DEIS, Univ. of Bologna, Bologna, Italy

08:45-09:00  **The relationship between the knee adduction torque and medial contact force during gait #5926**

Dong Zhao a, Scott A. Banks a,b,c, Kim Mitchell c, Darryl D'Lima d, Clifford Colwell Jr d, Benjamin J. Fregly a,b, a Dept. of Mechanical & Aerospace Engineering, Univ. of Florida, Gainesville, USA; b Dept. of Biomedical Engineering, Univ. of Florida, Gainesville, USA; c The BioMotion Foundation, Palm Beach, USA; d Shiley Center for Orthopaedic Research & Education at Scripps Clinic, La Jolla, USA

09:00-09:15  **Do microprocessor-controlled knees work better? #5943**

KR Kaufman a, B Iverson*, D Padgett PT, RH Brey b, JA Levine c, MJ Joyner d a Biomechanics/Motion Analysis Laboratory, b Vestibular Laboratory, c Endocrine Research Laboratory, d Anesthesia Research, Mayo Clinic, Rochester, MN, USA

09:15-09:30  **Mediation of Knee Strength by a Psychosocial Factor to Affect Walking Performance in Knee Osteoarthritis #6995**

MR Maly a, PA Costigan b and SJ Olney c, a School of Physical Therapy, The Univ. of Western Ontario, London, Ontario, Canada; b School of Physical Health Education and School of Rehabilitation Therapy, Queen’s Univ., Kingston, Ontario, Canada

09:30-09:45  **Application of functional data analysis techniques to study knee biomechanics in patients with degenerative arthritis before and after total knee replacement #5049**

Carolina Ávila, Álvaro Page, Carlos Atienza, Alfonso Oltra, Amelia Gómez, Amparo López, Pedro Vera, Jaime Prat; Instituto de Biomecánica de Valencia, Universidad Politécnica de Valencia, Valencia, Spain

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**3. Musculoskeletal systems and Performance-Joint ISB/ESB Track**

**3.1.4.5 Upper Extremity**

**Session Organizers:** Franz van der Helm, C. Disselhorst-Klug
5th World Congress of Biomechanics

Tuesday August 1
Room R0.007

08:15-08:30 Moved to Poster Session

08:30-08:45 Influence of the shape of the acromion on joint reaction force and humeral head translation during abduction in the scapular plane #5740
Alexandre Terrier¹, Adrian Reist², Richard W Nyffeler³; ¹Biomechanical Orthopaedics Laboratory, Swiss Federal Institute of Technology, Lausanne, Switzerland
²Dept. of Orthopaedic Surgery, Inselspital, Univ. of Berne, Switzerland

08:45-09:00 The development of a robotic joint model based on human shoulder morphology #5557
Nobuo Sakai, Sawae Yoshinori, Teruo Murakami; Dept. of Intelligent Machinery and Systems, Kyushu Univ., Fukuoka, Japan

09:00-09:15 In-Vivo Estimation Of The Kinematic Parameters Of The Trapezio-Metacarpal Joint Using Surface Markers #7275
Pietro Cerveri², Elena De Momi², Nicola Lopomo³, Gabriel Baud-Bovy³, Pier Giorgio Pajardi³, Giancarlo Ferrigno³; ²TBM Lab, Bioengineering Dept., Politecnico di Milano, Milan, Italy; ³Dept. of Orthopaedics, San Raffaele Univ., Milano, Italy; ⁴Centro Studi Mano - c/o Policlinico Multimedica, Milano, Italy

09:15-09:30 Gender differences in musculoskeletal properties during wrist flexion #6972
Erwan Stephan⁵, Cécile Bisch⁵, Stéphane Delanaud, Jean-Pierre Libert⁵, Chantal Pérot⁶; ⁵Equipe DMAG-INERIS (EA 3901), UPJV, Amiens, France; ⁶Département de Génie Biologique, UMR CNRS 6600, UTC, Compiègne, France

4. Implants for Trauma and Orthopedics-Joint ESB Track

4.2.3 Hip Endoprosthetics - Resurfacing Implants, Short Stems, Minimaly Invasive Surgery

Chairs: Luca Cristofolini, Wolfgang Plitz

Tuesday August 1
Room E1.03

08:15-08:30 Femoral cementing techniques for hip resurfacing arthroplasty #7182
Bitsch R.G.⁷, Loidolt T.⁸, Heisel C.⁹, Schmalzried T.P.¹⁰; ⁷Univ. of Heidelberg, Germany; ⁸Joint Replacement Institute, Los Angeles, USA

08:30-08:45 Volumetric In-Vitro Evaluation of Cement Penetration in Hip Resurfacing Implants using Computer Tomography #4153
R. Howald¹¹; U. Kesteris¹²; M. Wittwer¹³; K. Zhang¹⁴, D. Yakimicki¹⁵, R. Klubunde¹⁵, J. Krevolin¹⁵; ¹¹Zimmer Corporate Research, Winterthur, Switzerland; ¹²Zimmer Corporate Research, Warsaw IN, USA; ¹³Univ. Hospital, Lund, Sweden; ¹⁴Federal Institute of Technology (ETH), Zurich, Switzerland

08:45-09:00 Effects of hip resurfacing components positioning on range of motion #7538
D. Plamondon¹⁶, R. Winzenrieth¹⁶, M. Lavigne¹⁶, PA. Vendittoli¹⁶, N. Nuño¹⁶; ¹⁶Département de génie de la production automatisée, École de technologie supérieure, Laboratoire de recherche en imagerie et orthopédie, Montréal, ¹⁷Département d’orthopédie, Hôpital Maisonneuve-Rosemont, Montréal

09:00-09:15 What length is sufficient for good primary stability in THA #7597
Lee C, Jakubowitz E, Bitsch R, Thomsen M; Laboratory of Biomechanics and Implant Research, Orthopaedic Univ. Clinic of Heidelberg, Germany

09:15-09:30 An explorative finite element study of a new conservative proximal epiphyseal replacement #6478
Martelli S., Moindreau M., Rushton N., Field R., and Viceconti M.
5. Occupational and Impact Injury Biomechanics

5.1. Spinal Kinematics and Injury Biomechanics

**Session Organizers:** Dale Bass, Barclay Morrison  
**Chair:** Dale Bass  
**Tuesday August 1**  
**Room R0.058**

08:15-08:30  The stabilizing effects of different orthoses in the intact and unstable cervical spine - A cadaver study #4088  
Uli Schmucker a, Gerrit Matthes a, Loren L. Latta b, Reinhold A. Laun c, Axel Ekkernkamp a, Dirk Richter b; a Ernst-Moritz-Arndt-Univ. Greifswald, Orthopaedic and Trauma Surgery, Greifswald, Germany; b Hospital Berlin-Neukoelln, Orthopaedic and Trauma Surgery, Berlin, Germany

08:30-08:45  Immature Sheep Spine Motion Segments Show Greater Flexibility and Lower Stiffness than Adult in Response to Pure Moment Application #4454  
EC Clarke a,b, RC Appleyard c, LE Bilston a; a Aerospace, Mechanical and Mechatronic Engineering, The Univ. of Sydney, Sydney, Australia; b Prince of Wales Medical Research Institute, Sydney, Australia; c Murray Maxwell Biomechanics Laboratory, Orthopaedics and Traumatic Surgery, Royal North Shore Hospital, Sydney, Australia

08:45-09:00  Strain energy density variations of osteoporotic spine column after bone segment augmentation An in vitro porcine biomechanical model #5325  
Chun-Kai Chiang, Jaw-Lin Wang; Institute of Biomedical Engineering, National Taiwan Univ., Taipei, Taiwan

09:00-09:15  The effect of cerebrospinal fluid on the biomechanics of spinal cord: an in vitro animal model study # 5468  
C.F. Jones a,b, S.G. Reed b, P.A. Cripton b, R.M. Hall a; a School of Mechanical Engineering, Univ. of Leeds, Leeds, United Kingdom; b Injury Biomechanics Laboratory, School of Mechanical Engineering, Univ. of British Columbia, Vancouver, Canada

09:15-09:30  Development and evaluation of a continuum neck muscle model #6317  
Sofia Hedestien a, Peter Hallidin a, Karin Brohin a, Hans von Holst b, c; b Dept. of Neuronics, Royal Institute of Technology, Stockholm, Sweden; c Univ. of British Columbia, Vancouver, Canada

09:30-09:45  Biomechanics and Early Pathology of Spinal Cord Injury Depend on Direction of Vertebral Fracture Dislocation # 6756  
EC Clarke a,b, AM Choo a, J Liu a, CK Lam c, LE Bilston b, W Tetzlaff, TR Oxlund a; a Univ. of Sydney, Sydney, Australia; b Prince of Wales Medical Research Institute, Sydney, Australia; c Univ. of British Columbia, Vancouver, Canada

5. Occupational and Impact Injury Biomechanics

5.12.1 Rehabilitation Mechanics-Joint ISB Session

**Session Organizer /Chair:** Arthur Mak  
**Tuesday August 1**  
**Room R1.005**

08:15-08:30  Effect of Insoles on Plantar Pressure Relief – A 3D Finite Element Analysis #7198  
Ming Zhang a, Jason Tak-Man Cheung a,b; a Dept. of Health Technology and Informatics, The Hong Kong Polytechnic Univ., Hong Kong; b Human Performance Laboratory, Faculty of Kinesiology, Univ. of Calgary, Canada

08:30-08:45  Withdrawn

08:45-09:00  Using Virtual Reality Biofeedback to Improve Manipulative Skill of Manual Wheelchair Users #5407
Chih-Hung Tsai, Sai-Wei Yang, Yuan-Yi Fan; Institute of Biomedical Engineering, National Yang-Ming Univ., Taipei, Taiwan

09:00-09:15 The measurement of pressure forces created by the contact of a rider’s body on the horse’s back during hippotherapy #5608
Dvorakova Tereza, Pelham Christian, Janura Miroslav, Svoboda Zdenek; Palacky Univ. Olomouc, Dept. of Biomechanics and Engineering Cybernetics, Faculty of Physical Culture, Olomouc, Czech Republic; Univ. of Veterinary Medicine Vienna, Clinic of Orthopaedics in Ungulates, Vienna, Austria

09:15-09:30 Evaluation of unilateral-operated wheelchairs for patient with hemiplegia #7667
Kuen-Horng Tsai, Chun-Yu Yeh, Hsin-Chang Lo; Graduate Institute of System Engineering, National Univ. of Tainan, Taiwan; School of Physical Therapy, Chung Shan Medical Univ., Taiwan; Institute of Biomedical Engineering, National Cheng Kung Univ., Taiwan

09:30-09:45 External mechanical work done by each leg during walking in stroke patients #5775
Stoquart G.G., Detrembleur C., Lejeune T.M.; Rehabilitation and Physical Medicine Dept., UCL, Brussels, Belgium

b The Gait Study Center, Temple Univ. School of Podiatric Medicine, Philadelphia, PA, USA; c Dept. of Rheumatology, Veterans Administration Medical Center, Philadelphia, PA, USA

6. Sport Biomechanics-Joint ISB Track
6.1.3. Traumatology-Orthopaedics
Session Organizers/Chairs: Hermann Anetzberger
Tuesday August 1
Room D2.12

08:15-08:30 Reconstruction of the anterior cruciate ligament (ACL) in double-bundle-technique: Biomechanical evaluation of possible insertion points #5284
Stephan Lorenz, Michael Berra, Wolfgang Unkhür, Stefan Eichhorn, Andreas B. Imhoff; Dept. of Sports Orthopedic, Klinik für Orthopädie und Sportorthopädie, Klinikum rechts der Isar, Technical Univ. of Munich, Germany; Dept. of Biomechanics, Klinik für Orthopädie und Sportorthopädie, Klinikum rechts der Isar, Technical Univ. of Munich, Germany

08:30-08:45 Landing style differences between anterior cruciate ligament deficient and healthy subjects #4271
Robert van Deursen, Nicola Phillips; Research Centre for Clinical Kinaesiology, School of Healthcare Studies, Cardiff Univ., Cardiff, UK

08:45-09:00 A biomechanical study of graft failure in early period of graft fixation in acl surgery # 6714
M Bhattacharyya; Investigation performed at Imperial College London, UK

09:00-09:15 #7058 has been moved to the Poster Session

6. Sport Biomechanics-Joint ISB Track
6.11 Musculoskeletal Systems
Session Organizers: Tetsuo Fukunaga
Tuesday August 1
Room R1.003

08:15-08:30 The influence of the musculoskeletal system on the control mechanism of quiet standing #7297
Kei Masani, Albert H. Vette, Masaki Abe, Alan Morris, Kimitaka Nakazawa, Milos R. Popovic; Institute of Biomaterials and Biomedical Engineering, Univ. of Toronto, Toronto, Canada; Rehabilitation Engineering Laboratory, Toronto Rehab, Toronto, Canada; Research Institute NRC, Tokorozawa, Japan; Bloorview Kids Rehab, Toronto Research Institute, Toronto, Canada

08:30-08:45 Plasticity and adaptability of human tendon structures in vivo #6521
08:45-09:00  Relations between the architecture and the function of the musculoskeletal system studied through computer simulation #4465
Akinori Nagano\textsuperscript{a}, Taku Komura\textsuperscript{a}, Shinsuke Yoshioka\textsuperscript{c}, Senshi Fukashiro\textsuperscript{c}; \textsuperscript{a}Computational Biomechanics Unit, RIKEN, Japan; \textsuperscript{b}Dept. of Computer Science, City Univ. of Hong Kong, Hong Kong; \textsuperscript{c}Dept. of Life Sciences (Sports Sciences), the Univ. of Tokyo, Japan

09:00-09:15  In vivo muscle behavior during human locomotion #6786
Masaki Ishikawa and Paavo V. Komi; Neuromuscular Research Center, Dept. of Biology of Physical Activity, Univ. of Jyväskylä, Jyväskylä, Finland

09:15-09:30  Passive mechanical properties of the human muscle-tendon complex at different temperatures #6188
Tetsuro Murakoa\textsuperscript{a}, Kohei Omuro\textsuperscript{b}, Taku Wakahara\textsuperscript{a}, Tetsuo Fukunaga\textsuperscript{c}, Kazuyuki Kanosue\textsuperscript{c}; \textsuperscript{a}Consolidated Research Institute for Advanced Science and Medical Care, Waseda Univ., Saitama, Japan; \textsuperscript{b}Graduate School of Human Sciences, Waseda Univ., Saitama, Japan; \textsuperscript{c}Faculty of Sports Sciences, Waseda Univ., Saitama, Japan

09:30-09:45  A kinematic factor that risks subacromial structures to impingement #7846
Toshimasa Yanai\textsuperscript{a}, Tetsuo Fukunaga\textsuperscript{a}; \textsuperscript{a}Chukyo Univ., Toyota, Japan; \textsuperscript{b}Waseda Univ., Tokorozawa, Japan

10. Cellular and Molecular Mechanics

10.2.2 Cell Mechanics

Session Organizer /Chair: Ben Fabry

Tuesday August 1
Room G0.43

08:15-08:30  The effect of differentiation on the cytoskeleton of cells: A physicist’s view on stem cells #4743
F. Lautenschläger, S. Schinkinger, and J. Guck; Universität Leipzig, Abteilung Physik der weichen Materie, Leipzig, Germany

08:30-08:45  Atomic force microscopy based technique to measure the viscoelastic response of fibroblasts and chondrocytes using unconfined compression #7543
K. Bose, G.A. Ateshian, K. D. Costa; Dept. of Biomedical Engineering, Columbia Univ., New York, U.S.A

08:45-09:00  Dynamics of cell alignment and altered morphology induced by cyclically stretched substrates #7513
Simon Jungbauer\textsuperscript{a}, Ralf Kemkemer\textsuperscript{a}, Huajian Gao\textsuperscript{ab}; \textsuperscript{a}Max-Planck-Institute for Metals Research, Stuttgart, Germany; \textsuperscript{b}Brown Univ., Providence, USA

09:00-09:15  Spatiotemporal heterogeneity of cardiac myocyte stiffness is greater during contraction than relaxation #7492
Evren U. Azeloglu, Keyue Shen, Lance C. Kam, Kevin D. Costa; Dept. of Biomedical Engineering, Columbia Univ., New York, NY

09:15-09:30  Mechanical Properties of Cells as Diagnostic Marker for Oral Cancer #7035
Falk Wattasahl\textsuperscript{a}, Julia Dietrich\textsuperscript{b}, Stefan Schinkinger\textsuperscript{a}, Bryan Lincoln\textsuperscript{a}, Torsten Remmerbach\textsuperscript{a}, Jochen Guck\textsuperscript{a}; \textsuperscript{a}Max-Planck-Institute for Experimental Medicine, Göttingen, Germany; \textsuperscript{b}Klinik und Poliklinik für Mund-, Kiefer- und plastische Gesichtschirurgie, Leipzig, Germany

09:30-09:45  Glue or goo? Mechanical properties of glial cells and neurons in the CNS #6591
Kristian Franze\textsuperscript{ab}, Yunbi Lu\textsuperscript{abce}, Christian Steinhäuser\textsuperscript{d}, Frank Kirchhoff\textsuperscript{b}, Hartwig Wolburg\textsuperscript{a}, Jochen Guck\textsuperscript{a}, Paul Janmey\textsuperscript{a}, Andreas Reichenbach\textsuperscript{b} Josef Käs\textsuperscript{a}; \textsuperscript{a}Soft Matter Physics, Universität Leipzig, Germany; \textsuperscript{b}Paul-Flechsig-Institute for Brain Research, Universität Leipzig, Germany; \textsuperscript{c}Dept. of Pharmacology, Zhejiang Univ., China; \textsuperscript{d}Dept. of Neurosurgery, Universität Bonn, Germany; \textsuperscript{e}Max-Planck-Institute for Experimental Medicine, Göttingen, Germany; \textsuperscript{f}Institute of Pathology, Universität Tübingen, Germany; \textsuperscript{g}Institute for Medicine and Engineering, Univ. of Pennsylvania, Philadelphia, USA
13. Respiratory Mechanics

Track Coordinators: Robert C Schroter, David Elad

13.1 Transport in the Respiratory Airways

Session Organizers /Chairs: Merryn Tawhai, Robert C Schroter

Tuesday August 1
Room R2.088

08:15-08:30 Models of pulmonary transport: ventilation, perfusion, and medical imaging #7026
M H Tawhai¹, K S Burrowes², K L Hedgers³, C-L Lin⁴, G McLennan⁵,⁶, E A Hoffman⁷,⁸
¹Bioengineering Institute, The Univ. of Auckland, Auckland, New Zealand; ²Oxford Univ. Computing Laboratory, The Univ. of Oxford, Oxford, UK; ³IIHR-Hydroscience & Engineering, ⁴Biomedical Engineering, ⁵Medicine and ⁶Radiology, The Univ. of Iowa, Iowa City, USA

08:30-08:45 Alveolar recirculation and chaotic mixing #5196
F. E. Laine-Pearson¹, Akira Tsuda²; ¹Univ. of Surrey, Guildford, UK; ²Harvard Univ., Boston, USA

08:45-09:00 Simulation of Reactive Gas Uptake Distributions into Airway Bifurcations #6105
James S. Ultman, Adekemi B. Taylor, Ali Borhan; Dept. of Chemical Engineering, Penn State Univ., Univ. Park, Pennsylvania, USA

09:00-09:15 The use of aerosols to study convective mixing in the lung #5197
Chantal Darquenne, G. Kim Prisk; Dept. Medicine, Univ. of California at San Diego, La Jolla, USA

09:15-09:30 Multiscale simulation of air flow in the CT-based lung model #5319
Ching-Long Lin¹,², Merryn H. Tawhai¹, Geoffrey McLennan³,⁴, and Eric A. Hoffman⁵,⁶,⁷
¹Dept. of Mechanical and Industrial Engineering, ²IIHR-Hydroscience & Engineering, ³Biomedical Engineering, ⁴Medicine and ⁵Radiology, The Univ. of Iowa, Iowa City, U.S.A.
⁶Bioengineering Institute, The Univ. of Auckland, New Zealand

09:30-09:45 Active and Passive Cilia Motion: A Computational Fluid Mechanics Model #4882
Duanduan Chen¹, Siegfried Graf¹, Dominic Norris¹, Shankar Sundaram², Yiannis Ventikos²
¹Fluidics and Biocomplexity Group & Institute of Biomedical Engineering, Dept. of Engineering Science, Univ. of Oxford, Parks Road, Oxford, OX1 3PH, UK; ²Diagnostics Development Unit, Dept. of Haematology, Univ. of Cambridge, Cambridge, U.K.; ³MRC Mammalian Genetics Unit, Harwell, Oxfordshire, U.K.; ⁴Biomedical Technology Branch, CFD Research Corporation, Huntsville, AL, U.S.A.

14. Cardiovascular Mechanics

14.3.1 Hemodynamics and Vascular Biology I

Session Organizers /Chairs: John Lever, C. K. Zarins

Tuesday August 1
Room G0.01

08:15-08:45 Mechanisms of flow induced arterial remodeling and intimal hyperplasia #6710
Christopher K. Zarins¹,², Eiketsu Shoa³, Chengpei Xua³, Hirotake Masuda³, Seymour Glagov⁴
¹Stanford Univ., Stanford, CA, USA; ²Akita Univ., Akita, Japan; ³The Univ. of Chicago, Chicago, IL, USA

08:45-09:00 Shear stress predicts distribution of high strain spots on plaques in human coronary arteries # 4589
Frank Gijsena, Jolanda Wentzel¹, Frits Mastika, Johannes Schara,b, Johan Schuurbiers¹, Pim de Feyter¹, Anton van der Steen¹ and Patrick Serruysb; Dept. of Biomedical Engineering¹ and Interventional Cardiology¹, Erasmus MC, Rotterdam, The Netherlands

09:00-09:15 Effects of reduced cyclic stretch on vascular smooth muscle cell function of pig carotids perfused in vitro #4973
Veronica Gambillara, Tyler Thacher, Rafaela da Silva, Paolo Silacci and Nikos Stergiopulos Laboratory of Hemodynamics and Cardiovascular Technology, Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland
09:15-09:30  Study on the relationship between plaque composition and shear stress in human coronary arteries in vivo #5009  
Jolanda Wentzel, Frank J.H. Gijsen, Johan C.H. Schuurbiers, Hector M. Garcia-Garcia, 
Anton F.W. van der Steen, Patrick W. Serruys; a Biomedical Engineering, ErasmusMC, 
Rotterdam, the Netherlands; b Interventional Cardiology, ErasmusMC, Rotterdam, the Netherlands

09:30-09:45  Hemodynamic wall shear stress and expression of VCAM-1 and ICAM-1 in the mouse aorta #6683  
Suo Jin, Dardo E. Ferrara, John Oshinski, Robert W. Taylor and Don P. Giddens; a Wallace H. Coulter Dept. of Biomedical Engineering, Georgia Institute of Technology and Emory Univ. School of Medicine, Atlanta, USA; b Dept. of Medicine, Emory Univ. School of Medicine, Atlanta, USA

14. Cardiovascular Mechanics  
14.4.1 Heart-Arterial Interaction  
Session Organizers: Peter Hunter  
Tuesday August 1  
Room G1.27

08:15-08:45  Keynote: Comparative effects on left ventricular performance, arterial hemodynamics, and left ventriculo-arterial (VA) coupling of two models of coronary artery occlusion in pigs # 7873  
Philippe Kolh, Vincent Tchana-Sato, Alexandre Ghuysen, Bernard Lambermont, Vincent D’Orio, Raymond Limet, Stephanie Rolin, Jean-Michel Dogné; a Hemodynamic Research Centre, Univ. of Liège, LIEGE, Belgium; b Dept. of Pharmacy, Univ. of Namur, NAMUR, Belgium

08:45-09:00  Ventricular-vascular coupling in numerical models of cardiac electromechanics #6028  
Roy Kerckhoffs, Quan Gu, Jeff Omens, Andrew McCulloch; a Dept. of Bioengineering, UC, San Diego, USA; b Dept. of Structural Engineering, UC, San Diego, USA; c Dept. of Medicine, UC, San Diego, USA

09:00-09:15  Ventricular-arterial coupling in a rat model of reduced arterial compliance provoked by hypervitaminosis D and nicotine #4051  
David Jegger, Rafaela da Silva, Xavier Jeanrenaud, Mohammad Nasrullah, Hendrik Tevaearai, Ludwig K. von Segesser, Patrick Segers, Virginie Gaillarde, Jeffrey Atkins, Isabelle Lartaud, Nikolaos Stergiopoulos; a Laboratory of Haemodynamics and Cardiovascular Technology, EPFL, b Dept. of Cardiovascular Surgery, CHUV, c Dept. of Cardiology, CHUV, (all Lausanne, Switzerland); d Dept. of Cardiovascular Surgery, Inselspital, Bern, Switzerland; e Pharmacology Laboratory, Pharmacy Faculty, Nancy, France; f Hydraulics Laboratory, Ghent Univ., Gent, Belgium

09:15-09:30  Determinants of left ventricular circumferential-radial shear strain # 6492  
Peter Bovendeerd, Sander Ubbink, Tammo Delhaas, Theo Arts; a Dept of Biomedical Engineering, Eindhoven Univ. of Technology, Eindhoven, The Netherlands; Dept of b Physiology and c Biophysics, Maastricht Univ., Maastricht, The Netherlands

09:30-09:45  Understanding and measuring flow in Aortic Stenosis with Magnetic Resonance Imaging #7868  
Kieran O’Brien, Brett Cowan, Ralph Stewart, Alistair Young; a Bioengineering Institute, b The Univ. of Auckland, New Zealand

15. Microcirculation  
Track Coordinators: Dominique Barthès-Biesel, Geert W. Schmid-Schönbein

15.1 Hemodynamics and Angiogenesis/Angioadaptation  
Session Organizers/Chairs: J. Weiss, Axel Pries  
Tuesday August 1  
Room R1.006

08:15-08:30  Angiogenesis and the extracellular matrix #5460  
Laxminarayanan Krishnan, James B. Hoying, Urs Utzinger, Quynhhoa Nguyen, Helen Song, Brian A. Birchler, Jeffrey A. Weiss; a Dept. of Bioengineering, Univ. of Utah,
alt Lake City, Utah, USA; b Biomedical Engineering and Regenerative Medicine Programs, Univ. of Arizona, Tucson, Arizona, USA

08:30-08:45  **Physical forces control vascular network remodeling in the embryo #7279**  
L. Jones\(^a\), V. Fleury\(^b\), A. Eichmann\(^\text{c}\), F. le Noble\(^\text{c}\); \(^a\)College de France, Paris, France; \(^b\)Univ. Of Rennes, Rennes, France; \(^c\) MDC-Berlin, Berlin, Germany

08:45-09:00  **Gene expression patterns related to angiogenesis #7395**  
Andreas Zakrzewicz\(^a\), Mauro Bongrazio\(^a\), Luis DaSilva-Azevedo\(^a\), Oliver Baumn\(^b\), Wulf Wunderlich\(^a\), Alexander Alter\(^c\), Judith Knöchel\(^c\), Axel R. Pries\(^c\); \(^a\)Institute of Physiology, Charité, Berlin, Germany; \(^b\)Institute of Anatomy, Univ. of Bern, Bern, Switzerland

09:00-09:15  **Blood flow and angiogenesis in skeletal muscle #7625**  
Oliver Baumn; Dept. of Anatomy, Univ. of Berne, Berne, Switzerland

09:15-09:30  **Angioadaptation in the lung #6947**  
Wolfgang M. Kuebler; Institute of Physiology, Charité – Universitaetsmedizin Berlin, Germany

09:30-09:45  **Mathematical modeling of angioadaptation in response to hemodynamic and metabolic stimuli #6809**  
Axel R. Pries\(^a\), Timothy W. Secomb\(^b\); \(^a\)Dept. of Physiology, Charité-Berlin, Berlin, Germany; \(^b\)Dept. of Physiology, Univ. of Arizona, Tucson, AZ, USA

### 16. Reproductive Biomechanics
#### 16.5 Mechanics of Embryonic Development

**Session Organizers /Chair:** Bradley B. Keller, C. Wayne Brodland  
**Tuesday August 1**  
**Room R000.6**

08:15-08:30  **Lessons from Embryos: Insights into Cardiovascular Morphogenesis and Adaptation #6711**  
Bradley B Keller, Li J. Liu, Joseph P. Tinney, and Kimimasa Tobita  
Division of Pediatric Cardiology, Children’s Hospital of Pittsburgh Heart Center, Univ. of Pittsburgh, PA, USA

08:30-08:45  **Cell mechanics: bridging the gap between gene expression and morphogenetic movements in embryonic tissues #4096**  
G. Wayne Brodland; Dept. of Civil Engineering, Univ. of Waterloo, Waterloo, Ontario, Canada

08:45-09:00  **The Characterisation of Mechanical Stresses in the Growing Avian Embryonic Limb #4477**  
Niamh C. Nowlan\(^a\), Paula Murphy\(^b\), Patrick J. Prendergast\(^a\)  
\(^a\)Trinity Centre for Bioengineering, School of Engineering, Trinity College Dublin, Ireland; \(^b\)Zoology, School of Natural Sciences, Trinity College Dublin, Ireland

09:00-09:15  **Dynamic Imaging of Fluid Forces and Heart Motions in Developing Embryos #7828**  
Mary Dickinson; Baylor College of Medicine, Houston, TX, USA

09:15-09:30  **Quantifying intravital fluid flow in development and disease #6160**  
Jay R. Hove; Genome Research Institute, Univ. of Cincinnati, Cincinnati, OH, USA

09:30-09:45  **Failure of conformational turning and aortic fusion defect in the cultured mouse embryo under inhibition of Hedgehog signaling #4456**  
Takashi Nagase, Masafumi Machida, Masaaki Yamagishi; Clinical Research Center, National Hospital Organization Murayama Medical Center, Tokyo, Japan.

### 17. Biomechanics in Nature
#### 17.3.2 Plant Biomechanics

**Session Organizers /Chair:** Roland Ennos, Olga Speck  
**Tuesday August 1**  
**Room R1.087**

08:15-08:30  **How can plant stand-up for so long? Skeletal adaptation and posture regulation in plants #6393**  
Bruno Mouli; UMR PIAF INRA UBP, Clermont-Ferrand, France

08:30-08:45  **Trees as engineering structures: Standing up to the wind #6908**  
Barry Gardiner, Bruce Nicoll; Forest Research, Northern Research Station, Roslin, Scotland, UK
08:45-09:00 Transferring self-repair processes in plants into technical applications #5788
Olga Specka, Thomas Specka, Sebastian Busch, Markus Rüggeber & Rolf Luchsinger
Competence Networks Biomimetics and BIOKON & Botanic Garden Univ. of Freiburg, Germany; prospective concepts ag, Glattbrugg, Switzerland

09:00-09:15 The effect of roots on soil reinforcement #4182
S. B. Mickovski, A.G. Bengough, M.F. Bransby, M.C.R. Davies, P.D Hallett & R. Sonnenberg, Univ. of Dundee, Civil Engineering Division, Dundee, Scotland; Scottish Crop Research Institute, Invergowrie, Scotland

09:15-09:30 The role of hardness and toughness in plant defences #5333
Peter Lucas, Anthropology, George Washington Univ., Washington DC, USA

09:30-09:45 The effect of silica on abrasiveness and herbivory of grasses #5703
Roland Ennos, Fergus P. Massey, and Sue E. Hartley, Faculty of Life Sciences, Univ. of Manchester, Manchester, UK; Dept. of Biology and Environmental Science, Univ. of Sussex, Brighton, UK

18. Trends in Cranial and Spinal Biomechanics
18.5 Neuroprosthetics
Session Organizers /Chairs: Robert Riener, Thierry Keller
Tuesday August 1
Room R2.007

08:15-08:45 Keynote: Neuroprostheses for restoration of motor functions – Overview #6447
Jochen Quintern, Neurological Hospital Bad Aibling, Bad Aibling, Germany

08:45-09:00 Central and peripheral contributions to contractions evoked by tetanic electrical stimulation of human muscle #7174
David F. Collins, Jesse C. Dean, Olle Lagerqust, Lisa M. Yates; Human Neurophysiology Laboratory, Faculty of Physical Education and Recreation, Centre for Neuroscience, Univ. of Alberta, Edmonton, Alberta, Canada

09:00-09:15 Transcutaneous stimulation technology #5002
Thierry Keller, Andreas Kuhn, Marc Lawrence, Automatic Control Lab., ETH Zurich, Switzerland; Spinal Cord Injury Center, Univ. Hospital Balgrist, Zurich, Switzerland

09:15-09:30 FES Implantable Technology #7767
Thomas Stieglitz, Martin Schuettler, Univ. of Freiburg IMTEK, Dept. of Microsystems Engineering, Laboratory for Biomedical Microtechnology, Freiburg, Germany

09:30-09:45 Moving thoughts – Brain-Computer Interface for control of grasp neuroprostheses in tetraplegic patients #5619
Rüdiger Rupp, Gernot Müller-Putz, Reinhold Scherer, Gert Pfurtscheller, Hans Jürgen Gerner; Orthopedic Univ. Hospital II, Heidelberg, Germany; Institute for Knowledge Discovery, Laboratory of Brain-Computer Interfaces, Graz Univ. of Technology, Graz, Austria

20. Biomechanics of Organs
20.3.1 Urinary Tract
Session Organizers/Chairs: David A. Vorp, Margot Damaser
Tuesday August 1
Room R1.008

08:15-08:30 Development of a Device for Measurement of Leak Point Pressure in Anesthetized Rats #5222
M.S. Damaser, P. Zaszczurynski, B.E. Schwartz, D.L. Lin, N. Esparza
Cleveland Clinic Foundation, Cleveland, OH, USA; Louis Stokes Cleveland VA Medical Center, Cleveland, OH, USA; Hines VA Hospital, Hines, IL, USA

08:30-08:45 Flow dynamics in a stented ureter #4847
JH Siggers, SL Waters, JAD Wattis and LJ Cummings; Division of Applied Mathematics, Univ. of Nottingham, Univ. Park, Nottingham, UK

08:45-09:00 Simulation of Urine Flow through the Male Lower Urinary Tract #4514
Ismail Korkmaz, Bernd Rogg; Chair of Fluid Mechanics, Ruhr-Univ. of Bochum, Germany

09:00-09:15 Development of a computational model urethra to study perineal noise as a diagnostic marker for prostatic obstruction #5565
Johan Pel, Ron van Mastrigt; Dept. of Urology, Erasmus MC, Rotterdam, Netherlands
09:15-09:30  Alterations of the Ex Vivo Biomechanical Properties of the Female Rat Urethra in Spinal Cord Injury (SCI) and Stress Urinary Incontinence (SUI) #5868
Rachelle Prantil a,e, Michael Chancellor, Naoki Yoshimura c,d, William de Groat a and David Vorp a,b,c; Depts. of a Bioengineering, b Surgery, c Urology, d Pharmacology and e McGowan Institute for Regenerative Medicine, Univ. of Pittsburgh, PA, USA

09:30-09:45  The passive biomechanical properties of fetal and newborn porcine ureter #6749
Helene Austevoll a,b, Carl Christian Danielsen a, Luis Sigaard Ferreira b, Marianna Lalla b, Lars Henning Olsen c,d, Jens Christian Djurhuus b, Troels Munch Jørgensen a,b,c; Dept. of Connective Tissue Biology, Institute of Anatomy, Univ. of Aarhus, Denmark; a Dept. of Clinical Medicine, Skejby Sygehus, Univ. of Aarhus, Denmark; ib Dept. of Urology, Section of Pediatric Urology, Skejby Sygehus, Aarhus, Denmark

Please note that this session has been moved to a later hour

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.2. Computational Biomechanics of Arteries in Health and Disease
Session Organizers: Krishnan B. Chandran, David A. Vorp
Tuesday August 1
Room R2.091

14:00-14:15  Hybrid approach to the global circulation modeling #4353
Alexander S. Kholodov a, Sergey S. Simakov b; a,b Department of Applied Mathematics, Moscow Institute of Physics and Technology, Moscow, Russia

14:15-14:30  Multi–Scale Oxygen Diffusion and Transport in the Cerebral Micro–vasculature #4876
Constantinos Hadjistassou, Keri Moyle, Yiannis Ventikos; Fluidics and Biocomplexity Group & Inst. of Biomedical Engineering, Dept. of Engineering Science, Univ. of Oxford, U.K.

14:30-14:45  Effects of local geometry on the fluid dynamics of coronary artery segments with implanted stents #5328
Vigmostad, S. a, Wahle, A. b, Olszewski, M. E. b, Rossen, J. D. c, Sonka, M. b, and Chandran, K. B. c; Depts. of a Biomedical Engineering, b Electrical and Computer Engineering and c Internal Medicine, The Univ. of Iowa, USA

14:45-15:00  Numerical study of pulsatile flow in composite arterial coronary grafts #5757
A.K. Politis a, G.P. Stavropoulos b, F.G. Panagopoulos b, N.S. Vlachos c and N.C. Markatos a; a School of Chemical Engineering, National Technical Univ. of Athens, Greece; b Dept. of Cardiac Surgery, Henry Dunant Hospital, Athens, Greece; c Dept. of Mechanical & Industrial Engineering, Univ. of Thessaly, Volos, Greece

15:00-15:15  Fluid mechanical perturbations induced by stent implantation: a numerical study #6205
Rossella Balossino, Francesca Gervaso, Francesco Migliavacca, Gabriele Dubini; Laboratory of Biological Structure Mechanics, Structural Engineering Dept., Politecnico di Milano, Milan, Italy

15:15-15:30  Computation of blood flows in arteries – predictive modelling of surgical procedures #7458
Gavin Tabor a, Philippe Young b, Florian Pierron b; a School of Engineering, Computer Science and Mathematics, Univ. of Exeter, Exeter, UK; b Simpleware Ltd, Exeter, UK

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.11 Computational Biomechanics of the Spine
Session Organizers /Chairs: Jacques M. Huyghe, Aboulfazl Shirazi-Adl
Tuesday August 1
Room R1.002

08:15-08:30  Influence of curved lines of action for trunk extensor muscles on load redistribution and stability of the spine during lifting #4222
N. Arjmand, A. Shirazi-Adl, B. Bazrgari; Dept. of Mechanical Engineering, École Polytechnique, Montréal, Québec, Canada

08:30-08:45  A multiphasic FE analysis of an L4-L5 motion segment with focus on the inhomogeneous intervertebral disc #5051
W. Ehlers, B. Markert, N. Karajan; Institute of Applied Mechanics (CE), Chair II (Continuum Mechanics), Univ. of Stuttgart, Stuttgart, Germany
**Thread 1: Computational Methods in Biomechanics and Mechanobiology**

**T1.17 Physiome Biomechanics and Mechanobiology**

**Session Organizers /Chair:** Marco Viceconti  
**Tuesday August 1**  
**Room R1.007**

08:15-08:30  **The GIOME Project #4765**  
Hans Gregersen; Center of Visceral Biomechanics and Pain, Aalborg Hospital, Aalborg, Denmark

08:30-08:45  **The Living Human Project #5336**  
Marco Viceconti, Laboratorio di Tecnologia Medica, Istituti Ortopedici Rizzoli, Bologna, Italy

08:45-09:00  **The EuroPhysiome Initiative # 5337**  
Marco Vicecontia and Gordon Clapworthyb; aLaboratorio di Tecnologia Medica, Istituti Ortopedici Rizzoli, Bologna, Italy; bUniv. of Luton, UK

09:00-09:15  **The Epitheliome: individual-based modelling of emergent behaviour resulting from cellular interaction #7919**  
Rod Smallwood, Mike Holcombe, Jenny Southgate, Sheila Mac Neil, Rod Hose

09:15-09:30  **Multi-scale modelling and simulation of the regulation of human early haematopoiesis #**  
Sylvie Troncale, Fariza Tahi, David Campard, Jean-Pierre Vannier, Janine Guespin

**Thread 2: Flow-Structure Interactions**

**T2.6 Abdominal and Cellular FSI**  
**Chairmen:** N. A. Hill, Oliver Jensen  
**Tuesday August 1**  
**Room R0.003**

08:15-08:45  **Computation of Peristaltic Transport and Mixing in the Small Intestine #6300**  
H.S. Udaykumar, S. Krishnan, S. Diillator, J.S. Marshall and K. Schulze; “Dept. of Medical and Industrial Engineering; bVA Medical Center and UIHC Univ. of Iowa, Iowa City, IA, USA

08:45-09:00  **One-Dimensional Fluid-Structure Interaction Model of Human Cystic Ducts #5037**  
W.G. Li, X.Y. Luob, N.A.Hill, A.G. Johnson, N. Bird, & S.B. Chin; aDept. of Mechanical Engineering, Univ. of Sheffield, Sheffield, UK; bDept. of Mathematics, Univ. of Glasgow, Glasgow, UK; bAcademic Surgical Unit, Royal Hallamshire Hospital, Sheffield, UK

09:00-09:  **Mathematical Model for the Opening of Thick Walled Elastic Tubes #6203**  
James G. Brasseur, Sudip Ghosh; The Pennsylvania State, Univ. Park, Univ.

09:15-09:30  **Hydrodynamic effects in oscillating AFM microcantilevers #6430**  
R.J. Clarke, J.Billingham, P.M. Williams, A.P. Pearson & O.E. Jensen; aCentre for Mathematical Medicine, School of Mathematical Sciences, Univ. of Nottingham, UK; bLaboratory of Biophysics and Surface Analysis, School of Pharmacy, Univ. of Nottingham, UK; cSchool of Mathematical Sciences, Univ. of Adelaide, SA, Australia
09:30-09:45  Dynamic shear stress at cell's membrane is governed by mechanical interaction between fluid and cell #5595
L D Blechaa, L Rakotomananab, F Razafimaheryb, P-Y Zambellic, D P Piolettia
a LBO, EPFL, Lausanne, Switzerland; bIRMAR, Univ. of Rennes I, Rennes, France
‘Hôpital Orthopédique de la Suisse Romande, Lausanne, Switzerland

ESB Student Award Presentations
Tuesday, August 1
Room R1.046
08:15-09:45

Idealization of pericellular fluid space geometry strongly influences the prediction of local stresses imparted by fluid drag on cell surfaces #7448
Eric J. Anderson, Melissa Knothe Tate; Depts. of Mechanical & Aerospace Engineering, Case Western Reserve University, Cleveland, OH, USA

Spatiotemporal heterogeneity of cardiac myocyte stiffness is greater during contraction than relaxation #7492
Evren U. Azeloglu, Keyue Shen, Lance C. Kam, Kevin D. Costa; Dept. of Biomedical Engineering, Columbia Univ., New York, NY

Mathematical modeling of bone regeneration including the angiogenic process #4613
Liesbet Geris, Jos Vander Sloten, Hans Van Oosterwyck; Division of Biomechanics and Engineering Design, Katholieke Universiteit Leuven, Leuven, Belgium

Effects of cyclic compression on epithelial transport and viral infection in an engineered airway wall model #4724
Alice Tomei, Melanie M. Choe, and Melody A. Swartz; Institute of Bioengineering, École Polytechnique Fédérale de Lausanne (EPFL) and Department of Biomedical Engineering, Northwestern University

ESB Clinical Biomechanics Awards
Room R1.046
11:00-12:30

E. M. Zanetti, S. S. Musso, A. L. Audenino
Femoral implants comparison by means of thermoelastic stress analysis #6897

E. Northwood and J. Fisher
In vitro investigation into the effects of uni and multi-directional motion on the friction, damage and wear of innovative chondroplasty materials against articular cartilage #4749

J. Luo, D. Skrzypieca, P. Pollintine, M. A. Adams, D. J. Annesley-Williams, P. Dolan
Changes in spinal load-sharing following vertebroplasty: effects of cement type, BMD and fracture severity #7420
Plenary Lecture
Tuesday, August 1
10:00-10:30
Room G0.01
Biomechanics Research and Sports Medicine’s Future: Meeting the Challenges of Keeping Your Knee and Shoulder Healthy #7909
Savio L.-Y. Woo, Ph.D., D.Sc. (Hon) Univ. of Pittsburgh, USA

Tuesday, August 1
11:00-12:30

1. Bone Mechanics – Joint ESB Track
Track Coordinators: Rik Huiskes, Reiner Gradinger

1.2.2 Bone Healing and Osteointegration
Session Organizers /Chairs: Keita Ito, Dominique Pioletti
Tuesday August 1
Room R0.055

11:00-11:15 Development of a dynamic mechanoregulation model based on shear strain and fluid flow to optimize distraction osteogenesis #5978
Sebastian Idelsohn, Josep A. Planell, F. Javier Gil, Damien Lacroix; Reference Centre for Bioengineering of Catalonia (CREBEC), Universitat Politècnica de Catalunya, Barcelona, Spain

11:15-11:30 Local strains and ossification in bone healing #7160
Mark Thompson, Devakar Epari, Hanna Schell, Georg Duda; Center for Musculoskeletal Surgery, Charité - Universitätsmedizin Berlin, Germany

11:30-11:45 Withdrawn

11:45-12:00 Using orthopedic implants for local bisphosphonate delivery in osteoporotic animals: a theoretical model #6914
Vincent Stadelmann, Dominique P. Pioletti; Biomechanical Orthopedics Laboratory, Swiss Federal Institute of Technology, Lausanne, Switzerland

12:00-12:15 BoneWelding® Technology: Micro-scale finite element analysis of load transfer at the implant-bone interface #6585
Stephen J. Ferguson, Urs Weber, Joerg Mayer; a MEM Research Center, Univ. of Bern, Bern, Switzerland; b WW Technology AG, Schlieren, Switzerland

12:15-12:30 The transcortical Göttingen Minipig Model for testing osteointegration of implant surfaces and the influence of a soluble CaP coating on osteointegration #5901
Schwarz ML, Kowarsch M, Rose S, Becker K, Lenz T, Brade J, Jani L, Feuerstack M, Herbig J, Scheller G; 1Laboratory for Biomechanics and Experimental Orthopedics, Dept. of Orthopaedic Surgery Mannheim, Germany; 2IBF Heidelberg, Germany; 3Dept. of Medical Statistics, Mannheim, Germany

2 Musculoskeletal Mechanics-Joint ISB Track

2.3.1 Motor Control of Human Movement (Motor Control)
Session Organizers /Chairs: W. I. Schoellhorn, Keith Davids
Tuesday August 1
Room R1.049

11:00-11:15 Running on bumpy ground: stiffness adjustment to vertical heights #7177
Sten Grimmer, Reinhard Blickhan; Dept. of Motion Science, Friedrich Schiller Univ., Jena, Germany
11:15-11:30 Scaling experiments applied to discrete multi-articular movements #6145
Robert Rein, Chris Button, Keith Davids; School of Physical Education, Univ. of Otago, NZ

11:30-11:45 Multiobjective Optimal Control Of Obstacle-Crossing In Acl-Injured Subjects #4584
Sheng-Chang Chen a, Tung-Wu Lu a, Hung-Chie Chiu b, Hsiu-Chen Lin b, Hung-Chaung Hsu b
aInstitute of Biomedical Engineering, National Taiwan Univ., Taipei, Taiwan; bDept. of Orthopaedic Surgery, China Medical Univ. Hospital, Taichung, Taiwan

11:45-12:00 Coordination of lower limb interceptive actions as a function of skill level #4457
Keith Davids, Jia Yi Chow and Chris Button; School of Physical Education, Univ. of Otago, New Zealand

12:00-12:15 Classification of movement analysis data for the early diagnosis of a developing spasticity in newborns with infantile cerebral palsy #6821
F. Heinzle a, L. Meinecke b, N. Brettbach-Faller b, G. Rau a, T. Schmitz-Rode b, C. Dasselhorst-Klug c; aHelmholtz-Institute for Biomedical Engineering, Chair of Applied Medical Engineering, Aachen, Germany; bSocial Pediatric Centre, Städtische Kliniken Esslingen, Germany

12:15-12:30 Factors affecting balance in stroke patients #5822
Lee Nolan a and Katarzyna Kaczmarczyk b; aLaboratory for Biomechanics and Motor Control, Karolinska Institutet and Univ. College of Physical Education and Sports, Stockholm, Sweden; bFaculty for Rehabilitation, Academy of Physical Education, Warsaw, Poland

2 Musculoskeletal Mechanics-Joint ISB Track

2.7.2 Musculoskeletal Modelling (Inverse and forward dynamics modelling)
Chairs: Maarten Bobbert, Ton van den Bogert
Tuesday August 1
Room R0.002

11:00-11:15 Synthesis of natural movements by inverse dynamics musculoskeletal modeling #4200
John Rasmussen a, Søren Tørholm Christensen b, Michael Damsgaard d; aDept. of Mechanical Engineering, Aalborg Univ., Aalborg, Denmark; bAnyBody Technology A/S, Aalborg, Denmark

11:15-11:30 A physiology based inverse dynamic analysis of musculotendon forces during human movement #5104
Friedl De Groote a, Goele Pipeleers a, Ilse Jonkers b, Bram Demueulenaere c, Jan Swevers d, Joris De Schutter a; a Div. PMA, Dept. of Mechanical Engineering, Katholieke Universiteit Leuven, Heverlee, Belgium; b Dept. of Kinesiology, FABER, Katholieke Universiteit Leuven, Heverlee, Belgium

11:30-11:45 Direct solution of the inverse optimization problem of load sharing between muscles #7283
Adam Siemieńś; Biomechanics Laboratory, Univ. School of Physical Education, Wrocław, Poland

11:45-12:00 A Novel Approach to Efficient Forward Dynamics Simulation and Optimization of Human Motion and Its Application #6595
Maximilian Stelzer, Oskar von Stryk; Simulation and Systems Optimization Group, Technische Universität Darmstadt, Germany

12:00-12:15 Large-scale forward dynamics simulation with a whole-body musculoskeletal model #6531
Kazunori Hase a, Goro Obinata b, Atsushi Nakayama c, Naomichi Ogihara c, Tasuku Usui a, Yasuhiro Tasaki a; aDept. of Mechanical Science and Engineering, Nagoya Univ., Nagoya, Japan; bCenter for Cooperative Research in Advanced Science and Technology, Nagoya Univ., Nagoya, Japan; cLaboratory of Physical Anthropology, Kyoto Univ., Kyoto, Japan

2 Musculoskeletal Mechanics-Joint ISB Track

2.8.6 Ligament and tendon mechanics
Session Organizers /Chairs: Savio L.Y. Woo, Richard E. Debski, Steve Abramowitch
Tuesday August 1
Room R1.004

11:00-11:15 Improvement of Tendon lubrication #4345
3. Musculoskeletal systems and Performance-Joint ISB/ESB Track

3.1.2.2 Knee

Session Organizers: Thomas P. Andriacchi, Fabio Catani
Tuesday August 1
Room R 0.005

11:00-11:15  Role of Gait Characteristics on Walking Performance in Knee Osteoarthritis #6994
MR Maly, PA Costigante and SJ Olney; ¹School of Physical Therapy, The Univ. of Western Ontario, London, Ontario, Canada; ²School of Physical & Health Education and ³School of Rehabilitation Therapy, Queen’s Univ., Kingston, Ontario, Canada

11:15-11:30  Changes in locomotion performance after total knee arthroplasty (preliminary results) #4427
Mirko Brandes, Michael Ringlingh, Axel Hillmannb, Dieter Rosenbaum; ¹Motion Analysis Lab, Univ. Hospital Muenster, Germany; ²Orthopaedic Dept., Hospital Ingolstadt, Germany

11:30-11:45  Beneficial effect of single whole body vibration training on sensorimotor control of the knee #4960
Mark Melnyk, Michael Faist; Maike Hodapp, Albert Gollhofer; ¹Institute of Sport Science, Univ. of Freiburg, Freiburg, Germany; ²Dept. of Neurology, Univ. of Freiburg, Freiburg, Germany

11:45-12:00  Rotational Knee Laxity Measurement Device: Reliability Assessment in a Cadaver Model #7593
Ryan S. Costie, Robert Allaire, Kevin M Bell, Volker Musahl, Erik Frazier, Thore Zantop, James J Irgang, Lars G. Gilbertson, Freddie H. Fu; Dept. of Orthopaedic Surgery, Univ. of Pittsburgh, Pittsburgh, PA, USA

12:00-12:15  Performance validation of an innovative orthotic knee joint based on an optimal four bar linkage #4853
José María Baydal, Ricard Barberà, Juan Manuel Belda, Rakel Poveda, Juan Vte. Durà, Juan Alfonso Gómez, Ana Cruz García, Pedro Vera; Institute of Biomechanics of Valencia, Politechnic Univ. of Valencia, Valencia, SPAIN

12:15-12:30  Three-Dimensional Patellar Kinematics in Weightbearing Flexion Using Open MRI #6740
E.J. McWalter, D.C. Wilson, D.F. Kachers, D.J. Hunter, D.R. Wilson; ¹Mechanical Engineering and ²Orthopaedics, Univ. of British Columbia, Vancouver, Canada; ³Birmingham and Women’s Hospital, Harvard Medical School, Boston, USA; ⁴Clinical Engineering and Research Training Unit, Boston Univ. School of Medicine, Boston, USA

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.1.4.6 Upper Extremity Session Organizers: Franz van der Helm, C. Disselhorst-Klug Tuesday, August 1 Room R0.007

11:00-11:15 A user friendly prosthesis for full arm replacement with more than four active axes #5795
Michele Camposaragna, Federico Casolo, Matteo Cocetta; Dept. Electrical Engineering, Man-machine System Mechanics Unit, Politecnico di Milano, Italy

11:15-11:30 Comparison between geometric and functional method for the estimation of the glenohumeral rotation center # 5773
a Annie Levasseur, ab Patrice Tétreault, a Jacques A de Guise, a Natalia Nuño, a Nicola Hagemeister; a Laboratoire de recherche en imagerie et orthopédie, École de technologie supérieure, Montréal, Canada; b Hôpital Notre-Dame, CHUM, Montréal, Canada

11:30-11:45 Determining in-vivo carrying angle by anatomical landmarks - reliability of a new method #6883
Zampagni M.L., Casino D., Martelli S., Visani A., Maracchi M.; Biomechanics Laboratory, Istituti Ortopedici Rizzoli, Bologna, Italy

11:45-12:00 Working range of elbow joint in confined wheelchair configuration #4958
Chien-Ju Lin, Po-Chou Lin, Fong-Chin Su; Institute of Biomedical Engineering, National Cheng Kung Univ., Tainan, Taiwan

12:00-12:15 Influence of the flattening of the glenohumeral joint on joint reaction force and humeral head translation during rotation in neutral abduction #5755
Adrian Reist, Alexandre Terrier, Alain Farron; a Biomechanical Orthopaedics Laboratory, Swiss Federal Institute of Technology, Lausanne, Switzerland; b Orthopaedic Hospital, Univ. of Lausanne, Switzerland

12:15-12:30 MRI-based estimation of muscle volume and length following tendon transfer surgery #6082
Katherine R.S. Holzbaur, Garry E. Gold, M. Elise Johanson, Wendy M. Murray; Bone and Joint Center, VA Palo Alto HCS, Palo Alto, CA, USA

4. Implants for Trauma and Orthopedics-Joint ESB Track
4.2.4 Hip Endoprosthetics-Femoral Load Transfer and Stem Loosening Chair: Massimiliano Baleani, Cheng-Kung Cheng Tuesday, Aug. 1 Room E1.03

11:00-11:15 The effect of common activities on the osseointegration of the femoral stem #6080
Justin Onisoru, Aron Iarovic, Lucian Capitanu, Mihai Popescu; Institute of Solid Mechanics, Bucharest, Romania; “Foisor” Orthopaedic Clinical Hospital, Bucharest, Romania

11:15-11:30 Can physiological loading of the proximal femur be reproduced with conservative hip implants? #7168
Speirs AD, Heller MO, Taylor WR, Duda GN, Perka C; Center for Musculoskeletal Surgery, Charité - Universitätsmedizin Berlin, Berlin, Germany

11:30-11:45 In-vitro pre-clinical assessment of hip stem loosening #4448
Luca Cristofolini, Georg Duda, Patrick J. Prendergast; a Medical Technology Lab, Rizzoli Orthopaedic Institutes, Bologna, Italy; b Engineering Faculty, Univ. of Bologna, Italy; c Charité–Univ. Medicine, Center for Musculoskeletal Surgery, Berlin, Germany; d Trinity Centre for Bioengineering, School of Engineering, Dublin, Ireland

11:45-12:00 Comparative theoretical study of the resistance against rotation in cementless THR stems #7446

12:00-12:15 Design and analysis of hollow hip prosthesis #4557
Chan-Tsung Yang ab, Cheng-Kung Cheng ab, Hung-Wen Wei ab, Institute of Biomedical Engineering and Joint Prosthesis Technology Research Center, National Yang Ming Univ., Taipei, TAIWAN

12:15-12:30 Primary stability assessment in hip arthroplasty: a device based on the vibrational technique #4850
E. Varinia,b, M. Lannoccab, E. Bialoblocka,b, A. Cappellob, L. Cristofolinia,b
Istituti Ortopedici Rizzoli, Laboratorio di Tecnologia Medica, Bologna, Italy; bUniv. of Bologna, Engineering Faculty, Bologna, Italy

5. Occupational and Impact Injury Biomechanics
5.3.2 Spine Kinematics and Injury Biomechanics

Session Organizers: Dale Bass, Barclay Morrison
Chair: Dale Bass
Tuesday August 1
Room R0.058

11:00-11:15 Temperature and Age Effects on High Rate Viscoelasticity of Cervical Spinal Components #4430
Scott R. Lucasa, Cameron R. Bassa, Chris J. Planchaka, Robert S. Salzarb, Barry S. Shenderb, Glenn Paskoffb, Center for Applied Biomechanics, Univ. of Virginia, Charlottesville, VA, USA; bNavair, Patuxent River, MD, USA

11:15-11:30 Development, Verification, and Validation of a Parametric Cervical Spine Injury Prediction Model #4931
Amber R. Bonivitcha, W. Loren Francisb, Frank Pintarb, Narayan Yoganandanb, Matthew Koebebe, Barry Shendera, Glenn Paskoffs, Ben H. Thackera, and Daniel P. Nicolettas
Southwest Research Institute, San Antonio, TX, USA; bMedical College of Wisconsin, Milwaukee, WI, USA; bGADAB Engineering, Fredericksburg, TX, USA; sNaval Air Warfare Center-Aircraft Division, Patuxent River, MD, USA

11:30-11:45 Pediatric Cervical Spine Range of Motion #5809
Kristy B. Arbogastab, Matthew R. Maltesea, Matthew F. Tomasellio, Purushottam A. Gholvea, Jared E. Friedmanb, John P. Dormansa,b; aCenter for Injury Research and Prevention, The Children’s Hospital of Philadelphia, USA; bThe Univ. of Pennsylvania School of Medicine, Philadelphia, USA

11:45-12:00 Tensile Mechanical Properties of the Pediatric Human Osteoligamentous Cervical Spine #5979
Jason F. Luck, Michael Prange, Roger W. Nightingale, Andre Loyd, Alan Dibb, Danielle Ottaviano, Laura Tranb, Barry S. Myers; Injury & Orthopaedic Biomechanics Research Laboratory, Dept. of Biomedical Engineering, Duke Univer., Durham, North Carolina, United States

12:00-12:15 Stability and fibre reinforced adhesive fixation of vertebral fractures in the upper cervical spine #7310
Karin Brolina, Axel Nordbergb, Hans von Holstaa,b; aDivision of Neuronic Engineering, Royal Institute of Technology, Stockholm, Sweden; bDivision of Neurosurgery, Karolinska Univ. Hospital, Stockholm, Sweden

12:15-12:30 Comparison of the Mechanical Performance of the Q3 and Hybrid III 3C Three-Yr-Old Dummy Necks #4537
Jennifer Kadlowecb, Matthew Maltesea, Alana DeSimonea, Steve Rowsona and Jami Saffiotia
Rowan Univ., Glassboro, NJ, USA; bChildren’s Hospital of Philadelphia, Philadelphia, PA, USA

12:30-12:45 Mobility of unstable fractures of the odontoid during helmet removal - A cadaver study #4180
Uli Schmuckera, Gerrit Mathesa, Loren L. Latta b, Wilfried Grörer, Axel Ekkernkampb, Dirk Richterc; aErnst-Moritz-Arndt-Univ. Greifswald, Orthopaedic and Trauma Surgery, Greifswald, Germany; bMax Biedermann Institute for Biomechanics, Univ. of Miami, FL, USA

5. Occupational and Impact Injury Biomechanics
5.12.2 Rehabilitation Mechanics Joint ISB Session
5th World Congress of Biomechanics

Session Organizer /Chair: Mary Rodgers
Tuesday August 1
Room R1.005

11:00-11:15  Assessing Foot Pathology Using Multi-Segment Foot Models: Implications for Clinical Practice #7053
Deborah A. Nawoczenski, Houck JR, Tome JM, Neville CG; Ithaca College – Rochester Campus, Center for Foot and Ankle Research, Rochester, NY, USA

11:15-11:30  Immediate Effects of Valgus Knee Bracing and Foot Orthoses for the Treatment of Varus Knee OA #7571
HJ Hillstrom\textsuperscript{a,b}, DJ Brower\textsuperscript{a}, B Heilman\textsuperscript{b}, E Kim\textsuperscript{b}, K Whitney\textsuperscript{b}, J McGuire\textsuperscript{b}, H.R. Schumacher\textsuperscript{c}
\textsuperscript{a}Motion Analysis Laboratory, Hospital for Special Surgery, New York, NY, USA
\textsuperscript{b}The Gait Study Center, Temple Univ. School of Podiatric Medicine, Philadelphia, PA, USA;
\textsuperscript{c}Dept. of Rheumatology, Veterans Administration Medical Center, Philadelphia, PA, USA

11:30-11:45  Gait Retraining to Reduce Injury Risk in Runners #6181
Irene S. Davis, PhD, PT, FACS; Univ. of Delaware, Newark, DE, USA; Drayer Physical Therapy Institute, Hummelstown, PA

11:45-12:00  Improving balance in elders with group Tai Chi exercise via videoconferencing #6761
Lawrence Malcolm Keyes\textsuperscript{a}, Ge Wu\textsuperscript{b}; \textsuperscript{a}Microdesign Consulting Inc., Colchester, Vermont, USA; \textsuperscript{b}Dept. of Physical Therapy, Univ. of Vermont, Burlington, Vermont, USA

12:00-12:15  Biomechanical Correlates to Aerobic Treadmill Training in Individuals with Chronic Stroke # 6987
M Rodgers\textsuperscript{a}, L Forrester\textsuperscript{b,c}, S Patterson\textsuperscript{b,c}, R Macko\textsuperscript{b,c}; Depts of Physical Therapy & Rehabilitation Science\textsuperscript{a}, Neurology\textsuperscript{b}, Univ. of Maryland School of Medicine; VA Medical Center\textsuperscript{c}, Baltimore, MD, USA

12:15-12:30  Does transverse plane mechanical compliance affect amputee gait and in-socket forces? #5807
Martin Twiste, Chris Nester, Laurence Kenney; Centre for Rehabilitation and Human Performance Research, Univ. of Salford, Salford, UK

6. Sport Biomechanics-Joint ISB Track
6.1.4.1 Rehabilitation Orthopaedics

Session Organizers: Hubert Hörterer, Roland Biedert
Tuesday August 1
Room D2.12

11:00-11:15  The influence of anthropomorphic features and bilateral knee strength on one-leg hop performance #4940
Wen-Ling Chen, Pei-Yun Lee, Chyun-Yu Yang; National Cheng Kung Univ., Tainan, Taiwan

11:15-11:30  Balance Performance and Ground Reaction Impact During Drop Landing After Ankle Taping #5389
Lan-Yuen Guo\textsuperscript{a}, Chich-Haung Yang\textsuperscript{b}, Chien-Fen Lin\textsuperscript{b}, Wen-Lan Wu\textsuperscript{a}, Ching-Yi Wang\textsuperscript{b}, Jyh-Jong Chang\textsuperscript{c}; \textsuperscript{a}Faculty of Sports Medicine, Kaohsiung Medical Univ., Kaohsiung, Taiwan;
\textsuperscript{b}Dept. of Physical Therapy, Tzu-Chi College of Technology, Hualien, Taiwan;
\textsuperscript{c}Faculty of Occupation Therapy, Kaohsiung Medical Univ., Kaohsiung, Taiwan

11:30-11:45  Gender Differences in Foot-Floor Braking Forces and Tibiofemoral Arthrokinematics During a Simulated Abrupt Stop Mechanism of Non-contact ACL Injury #6081
Deusinger RH, Minor K, Zou D, Nopachai D, Seedorf B; Human Biodynamics Lab, Physical Therapy Program, Wash. Univ. School of Medicine, St. Louis, MO, USA

11:45-12:00  Analysis of vibration transmission between experienced and recreational tennis players during backhand stroking # 6545
Jinn-Yen Chiang\textsuperscript{a,b}, Ching-Cheng Chiang\textsuperscript{c}, Shun-Hwa Wei\textsuperscript{d}, Tzuy-Yuang Shiang\textsuperscript{e}
\textsuperscript{a}National Changhua Univ. of Education, Changhua, Taiwan;
\textsuperscript{b}National College of Physical Education and Sports, Taoyuan, Taiwan;
\textsuperscript{c}Chang Gung Institute of Technology,
6. Sport Biomechanics-Joint ISB Track
6.12 Wavelet Analysis of Electromyographic Signals
Session Organizers /Chairs: Vinzenz von Tscharner, James Wakeling
Tuesday August 1
Room R1.003
11:00-11:15 Processing of Wavelet-Transformed Electromyographic Signals in Signal Space #5203
V. von Tscharner; Human Performance Laboratory, Univ. of Calgary, Canada
11:15-11:30 Physiological determinates of the non-stationary events resolved by wavelet analysis of myoelectric signals #7876
James Wakeling; Structure and Motion Laboratory, Royal Veterinary College, Univ. of London, UK
11:30-11:45 Time-frequency analysis with wavelets of surface EMG signals in patients with diplegic cerebral palsy #5363
Jacqueline Romkesa, Sabine Illi*, Beat Göpfert*, Reinald Brunner*; a Laboratory for Gait Analysis, Children's Univ. Hospital, Basel, Switzerland; b Laboratory for Orthopaedic Biomechanics, CM&BE Univ. of Basel, Switzerland
11:45-12:00 Gender difference in the functional electromyogram of knee extensors #4241
Beat Göpfert*, Simone Estermann*, Lillianna Kägi*, Jacqueline Romkesa, Dieter Wirza*; a Lab. for Orthopaedic Biomechanics, CM&BE, Univ. of Basel, Switzerland; b Lab. for Gait Analysis, Children's Univ. Hospital Basel (UKBB), Switzerland
12:00-12:15 Muscle Atrophy in Ankle Osteoarthritis and Its Rehabilitation with Total Ankle Arthroplasty #7553
Victor Valderrabano a b c, Vinzenz von Tscharner a, Benno M. Nigg a, Beat Göpfert c, Beat Hintermann b, Walter Dick b, Cyril B. Frank b; a Human Performance Laboratory and Orthopaedic Dept., Univ. of Calgary, Calgary, Canada; b Orthopaedic Dept., Univ. of Basel, Basel, Switzerland; c Laboratory for Orthopaedic Biomechanics, Univ. of Basel, Basel, Switzerland
12:15-12:30 Frequency and Conduction Velocity Analysis of the Abductor Pollicis Brevis Muscle during Early Fatigue #7658
M Marina Barandun a b, Vinzenz von Tscharner a, Claudia Meuli-Simmen c, Vaughan Bowen d, Victor Valderrabano a b c, Human Performance Laboratory, Univ. of Calgary, Calgary, Alberta, Canada; b Surgical Dept., Stadtpital Triemli, Zurich, Switzerland; c Division of Reconstructive and Handsurgery, Kantonsspital Aarau, Aarau, Switzerland; d Orthopaedic Dept., Univ. of Calgary, Calgary, Alberta, Canada; Orthopaedic Dept., Univ. Hospital of Basel, Basel, Switzerland

10. Cellular and Molecular Mechanics
10.3.1 Cell Migration and Molecular Motors
Session Organizers: Matt Lang, Dan Hammer
Tuesday August 1
Room G0.43
11:00-11:15 Correlating Cell Migration with Local Extracellular Matrix Properties #6027
David A. Vader a, David A. Weitz b; a Division of Engineering and Applied Sciences, Harvard Univ., Cambridge, MA, USA; b Physics Dept., Harvard Univ., Cambridge, MA, USA
11:15-11:30 Force Traction Microscopy Reveals Neutrophil Motility is Driven from the Rear #7784
Daniel A. Hammer a b, Lee Smith a; a Dept. of Chemical and Biomolecular Engineering, Univ. of Pennsylvania, Philadelphia, PA, USA; b Dept. of Bioengineering, Univ. of Pennsylvania, Philadelphia, PA, USA
11:30-11:45 Using Optical Tweezers to Study the Microrheological Properties of Actin Networks #6179
Jorge M. Ferrer a, Hyunguk Lee b, Ricardo R. Brau a, Roger D. Kamm b, Matthew J. Lang a b; a Biological Engineering Division, b Dept. of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA
11:45-12:00 Actin dynamics and optical guidance of neuronal growth cones #6410
Daniel Koch, Timo Betz, Allen Ehrlicher, Björn Stuhrmann, Michael Gögler, Josef Käs;
Institute for Soft Matter Physics, Univ. of Leipzig, Germany

12:00-12:15  Role of intercellular adherens junctions in endothelial cell cooperative motion #6500
Rabodzey A.A. a, Semino C.E. b, Kamn R.D. b, Dewey C.F.Jr. a, b Hatsopoulos Microfluids Laboratory MIT, Cambridge, USA; a, b Biological Engineering Division, MIT, Cambridge, USA

12:15-12:30  Application of genetic algorithms to determine cell traction field #5080
Zhaochun Yang, Jeen-Shang Lin, James H-C. Wang; MechanoBiology Laboratory, Depts. of Orthopedic Surgery, and Civil and Environmental Engineering, Univ. of Pittsburgh, PA, USA

13. Respiratory Mechanics
13.2.1 Airway Liquid Dynamics

Session Organizers /Chairs: Oliver E. Jensen, Don Gaver
Tuesday August 1
Room R2.088

11:00-11:15  Surfactant biophysical properties and their impact on pulmonary atelectrauma #6996
Donald P. Gaver a and Melissa A. Krueger a, b; Dept. of Biomedical Engineering, Tulane Univ., New Orleans, USA; a, b Division of Pulmonary & Critical Care Medicine, Univ. of Washington, Seattle, USA

11:15-11:30  Regulation of Airway Surface Liquid Volume by Phasic Shear Stress # 5999
Robert Tarran; Cystic Fibrosis Center, Univ. of North Carolina, NC, USA

11:30-11:45  Injury and repair of epithelial cells during the reopening of fluid-filled airways #6047
Samir N. Ghadiali a, b, Huseyin C. Yalcin a, Stephen D. Preite a; Dept. of Mechanical Engineering, Lehigh Univ., Bethlehem, PA, USA; b Bioengineering Program, Lehigh Univ., Bethlehem, PA, USA

11:45-12:00  The hydrophobic proteins of pulmonary surfactant promote the collapse of surfactant lipid monolayers #7472
Florence Lhert and Stephen B. Hall; Depts. of Biochemistry and Molecular Biology, Medicine, and Physiology and Pharmacology, Oregon Health & Science Univ., Portland, Oregon, U.S.A.

12:00-12:15  The influence of gravity in a two-dimensional model of airway reopening #4253
Andrew Hazel, Matthias Heil; School of Mathematics, Univ. of Manchester, U.K.

12:15-12:30  Effects of Inertia and Gravity on Steady Plug Propagation in a 2-D Channel #7025
Ying Zheng, Hideki, Fujioka and James B. Grotberg; Univ. of Michigan, Ann Arbor, MI, USA

14. Cardiovascular Mechanics
14.3.2 Hemodynamics and Vascular Biology II

Session Organizer: Niko Stergiopulos
Chairs: G. S. Kassab, L. V. McIntire
Tuesday August 1
Room G0.01

11:00-11:15  A novel computerized biomechanical perfusion system for ex vivo expression studies of artificial endothelial cell monolayer vessels #6386
N. Bergh, E. Ulfhammer, M Andersson, S Jern; Clinical Experimental Research Laboratory, Heart and L ung Institute, Sahlgrenska Univ. Hospital/Ostra, Göteborg, Sweden

11:15-11:30  Development of atherosclerotic phantom with a lipid inclusion #6640
Valerie Pazos a, b, Rosaire Mongrain a, b, Rames Galaz a, Richard Leask a, Jean-Claude Tardif b
a McGill Univ., Montreal, Quebec, Canada; b Institut de Cardiologie de Montréal, Quebec, Canada

11:30-11:45  Withdrawn

11:45-12:00  Microarray studies of gene expression of endothelial cells in response to pulsatile vs. steady shear stress #6336
Andrew Yee a, b, Suzanne G Eskin a, Larry V McIntire a, b; Dept. of Biomedical Engineering, Georgia Institute of Technology/Emory Univ. School of Medicine, Atlanta, GA, USA; b Dept. of Chemical Engineering, Rice Univ., Houston, TX, USA

12:00-12:15  In vivo effects of low and high shear stress on endothelial gene expression in the porcine iliac artery #6605
14. Cardiovascular Mechanics

14.4.2 Heart-Arterial Interaction

Session Organizers: Peter Hunter
Tuesday August 1
Room G1.27

11:00-11:30   Keynote: Arterial wall mechanics and remodeling using a constituent-based approach
#7849
N. Stergiopulos ; Ecole Polytechnique Fédérale de Lausanne (EPFL), Hemodynamics and Cardiovascular Technology Laboratory (LHTC), Lausanne, Switzerland

11:30-11:45   Shear Stress and Atherosclerosis #7780
R. Krams; Dept. Biomedical Engineering, Thoraxcenter, Rotterdam, The Netherlands

11:45-12:00   Non-invasive assessment of Ventriculo-Arterial Coupling in a Middle-Aged Population of Healthy Men and Women #6658
Patrick Segers⁶, Ernst Rietzschel⁷, Tom Claessens⁸, Marc De Buyzere⁸, Dirk De Bacquer⁸, Guy De Backer⁸, Thierry Gillebert⁹, Pascal Verdonck on behalf of the Asklepios investigators.⁶ Cardiovascular Mechanics and Biofluid Dynamics research unit, Institute Biomedical Technology, Ghent Univ., Ghent, Belgium; ⁷Dept. of Cardiovascular Medicine and ⁸Public Health, Ghent Univ. Hospital, Ghent, Belgium

12:00-12:15   Estimation of arterial compliance in small size animal by four-element windkessel models of aortic input impedance #4784
Roberto Burattini; Dept. of Electromagnetics and Bioengineering, Polytechnic Univ. of Marche, Ancona, Italy

12:15-12:30   Possible Interaction Of Myocytes And Coronary Microcirculation – View From Transmural Difference Of Nano-Order Structure And Dynamics Of Left Ventricular Cardiac Myofilaments #7823
Juichiro Shimizu a, Satoshi Mohri b, Fumihiko Kajiya c; a Dept. of Physiology II, Nara Medical Univ., Nara; b Dept. of Cardiovascular Physiology, Okayama Univ., Okayama, and c Kawasaki Medical School, Kurashiki, Japan

15. Microcirculation

15.2 Molecular Mechanics of Cell Membranes and Their Microvascular Consequences: A Discussion about Red Cell Mechanics at the Molecular Level
Session Organizers / Chairs: Nadia Antonova, Qiang Zhu
Tuesday August 1
Room R1.006

11:00-11:30   Red blood cell adhesion molecule modifications potentiated adhesion, cytokine secretion and altered endothelial cell functions #4079

11:30-11:45   Hybrid Model of the Erythrocyte Membrane Skeleton Coupled with Its Lipid Bilayer #6185
Qiang Zhu⁴, Carlos Vera⁶, Robert Asaro ⁴, Robert Skelton⁵, and Lanping Amy Sung⁵b
⁴Dept. of Structural Engineering, ⁵Dept. of Bioengineering, ⁵Dept. of Mechanical and Aerospace Engineering, Jacobs School of Engineering, Univ. of California, San Diego, La Jolla, CA, USA

11:45-12:00   Nano-mechanics of a Tensegrity Network for the Erythrocyte Membrane Skeleton #6186
Robert Skelton⁵, Mauricio de Oliveira⁴, Carlos Vera⁶, and Lanping Amy Sung⁵b
⁴Dept. of Mechanical and Aerospace Engineering, ⁵Dept. of Bioengineering, Jacobs School of, Engineering, Univ. of California, San Diego. La Jolla, CA, USA

12:00-12:15   Extra-And Intracellular Signaling Pathways Under Changes Of Microreheological Blood Cell Propeties #5531
16. Reproductive Biomechanics
16.6 Penile Mechanics and Hemodynamics

Session Organizers: Amit Gefen, Ofer Barnea

Chair: Amit Gefen
Tuesday August 1
Room R000.6

11:00-11:30 Keynote: State of knowledge in structural mechanics of penile erection, and some areas of ignorance #4108
Amit Gefen a, Juza Chen b, David Elad a; aDept. of Biomedical Engineering, Faculty of Engineering, Tel Aviv Univ., Tel Aviv, Israel; bDept. of Urology, Tel Aviv-Sourasky Medical Center, Tel Aviv, Israel

11:30-11:45 The Relationship Between Cavernosal Expandability And Percent Smooth Muscle: A Theoretical Model #5918
Haibiao Luo a, Irwin Goldstein b and Daniel Udelson a b
a College of Engineering, b School of Medicine, Boston Univ., USA

11:45-12:00 Non-invasive assessment of penile vascular dysfunction during induced erection #6862
Shimon Hayun , Gabriel Gillon, and Ofer Barnea; Dept. of Biomedical Engineering, Faculty of Engineering, Tel Aviv Univ., Tel Aviv, Israel

12:00-12:15 Increasing and maintaining stiffness in amniote penises: Convergence in tissue design #5262
D. A. Kelly; Univ. of Massachusetts, Amherst, United States

12:15-12:30 A three-dimensional model of the penis for analysis of tissue stresses during erection #5360
Eran Linder-Ganz a, Amit Gefen a, Juza Chen b, David Elad a; aDept. Of Biomedical Engineering, Tel Aviv Univ., Israel; bDept. Of Urology, Tel Aviv Medical Center, Israel

17. Biomechanics in Nature
17.4.1 Swimming and Flying

Session Organizers Johann von Leeuwen Charlie Ellington

Chairs: Johann von Leeuwen, Malcolm Gordon
Tuesday August 1
Room R1.087

11:00-11:15 Muscle Specialization in the Squid Motor System #5902
William M. Kier; Dept. of Biology, Univ. of North Carolina, Chapel Hill, NC, USA

11:15-11:30 Form and function of the swimming muscles in fish #6746
J.L. van Leeuwen; Experimental Zoology Group, Wageningen Univ., Wageningen, The Netherlands

11:30-11:45 Modeling motor molecules mainly motivated by moths: computing muscle power and efficiency from nano-scale processes #6062
11:45-12:00 Antagonists of the avian wing: Mechanics of the pectoralis and supracoracoideus among flight modes in the pigeon #4633
Bret W. Tobalske a and Andrew A. Biewener b a Univ. of Portland, Portland, Oregon, USA, b Concord Field Station, Harvard Univ., Bedford, Massachusetts, USA

12:00-12:15 Modulation of power during flight #5707
G.N. Askew, D.J. Ellerby; aInstitute of Integrative and Comparative Biology, Univ. of Leeds, UK, b Dept. of Biological Sciences, Wellesley College, Wellesley MA, USA

12:15-12:30 Fluid mechanics of paddle-assisted walking in Atlantic Canadian lobster #4655
Jeanette L. L. Lim, M. Edwin DeMont; Dept. of Biology, St. Francis Xavier Univ., Antigonish, Nova Scotia, Canada

18. Trends in Cranial and Spinal Biomechanics
18.6 Intervertebral Disc Replacement
Session Organizer /Chair: Richard M. Hall
Tuesday August 1
Room R.2.007

11:00-11:20 Clinical Results of Total Lumbar Disc Replacement with ProDisc II: - 3-Year-Results for Different Indications #4412
H. Michael Mayer, Christoph J. Siepe, Karsten Wiechert, Andreas Korge; OrthoCenter Munich, Orthopaedic Clinic, Spine Center, Munich, Germany

11:20-11:40 Biomechanical Research Considerations for Total Disc Replacement #6334
Thomas D. Brown a, Richard M. Hall b, H. Michael Mayer c, John Fisher b, Sergio Mendoza a, Eileen Ingham b; a Univ. of Iowa, USA; b Univ. of Leeds, UK; c Spine Center Munich, Germany

11:40-12:00 Wear testing of spinal disc implants #4585
Kaddick C; EndoLab GmbH, Rosenheim, Germany

12:00-12:20 The Biomechanical Properties and Biological Ingrowth Characteristics of Porous Coated Motion Cervical Disc Arthroplasty #5991
Bryan W. Cunningham; Dept. of Orthopaedic Surgery, Johns Hopkins Univ.; Union Memorial Hospital, Baltimore, Maryland USA

12:00-12:15 panel discussion

Track Coordinators: John Tarbell, John Bischof
19.1 Microvascular Transport
Session Organizer /Chair: Norman Harris
Tuesday August 1
Room R0.003

11:00-11:30 Keynote: Separating permeability and haemodynamic components of microvascular transport #4443
C.C. Michel; Biomedical Sciences, Imperial College, London, UK.

11:30-11:45 Integration of Microvascular Transport within a Network: Considerations of Vessel Architecture, Sex, and Conditioning #4123
Virginia H. Huxley; Dept. Medical Pharmacology & Physiology and National Center for Gender Physiology, Univ. of Missouri School of Medicine, Columbia, MO, USA

11:45-12:00 The revised Starling Principle and steady state reabsorption from interstitium to blood #5241
F. E. Curry a, R. H. Adamson a, J. Ly a, X. Zhang b and S. Weinbaum b; a Dept. of Physiology and Membrane Biology, Univ. of California at Davis, CA, USA and b Depts. of Biomedical and Mechanical Engineering, City College, CUNY, NY, USA
12:00-12:15  Intravital microscopic studies of resistance arteries as a model for the investigation of endothel-dependent vasorelaxation in vivo #6451
Hans-Anton Lehr and Stephan Schäfer; Institut Universitaire de Pathologie, Centre Hospitalier, Universitaire Vaudois (CHUV), Lausanne, Switzerland

12:15-12:30  Theoretical models for flow regulation based on the length-tension characteristics of vascular smooth muscle # 6284
Timothy W. Secomb a, Brian E. Carlson b; a Dept. of Physiology, Univ. of Arizona, Tucson AZ, USA; b Dept. of Bioengineering, Univ. of Washington, Seattle, WA, USA

20. Biomechanics of Organs
20.3.2 Urinary Tract
Session Organizers /Chairs: Michael Sacks, Jiro Nagatomi
Tuesday August 1
Room R1.008

11:00-11:15  Long-term changes in material class of the urinary bladder wall following spinal cord injury #7501
Kevin K. Toosi a, Jiro Nagatomi b, Michael B. Chancellor c, Michael S. Sacks d; a Dept. of Bioengineering, Univ. of Pittsburgh, Pittsburgh, PA, USA; b Dept. of Bioengineering, Clemson Univ., Clemson, SC, USA; c Dept. of Urology, Univ. of Pittsburgh, Pittsburgh, PA, USA

11:15-11:30  Characterization of the regional biomechanics of the urinary bladder #7585
Sotirios Korossis a, Fiona Bolland b, John Kearney c, Jenny Southgate c, Eileen Ingham e, John Fisher f, a Institute of Medical & Biological Engineering Univ. of Leeds, Leeds, UK; b Jack Birch Unit, Univ. of York, York, UK; c Tissue Services, National Blood Service, Liverpool, UK

11:30-11:45  Contribution of the Extracellular Matrix to the Viscoelastic Behavior Increased elastogenesis alters storage function of the Bladder: A New Modeling Approach for Bladder Wall Tissue in Spinal Cord Injury Population #4649
Jiro Nagatomi a, Michael B. Chancellor, and Michael S. Sacks b; Pittsburgh, PA.; a Dept. of Bioengineering, Clemson Univ., Clemson, SC, USA; b Dept. of Bioengineering, Univ. of Pittsburgh, Pittsburgh, PA, USA

11:45-12:00  Compensation and decompensation of the urinary bladder muscle studied non-invasively in 827 asymptomatic healthy males #4414
R.van Mastrigt, J.W.N.C. Huang Foen Chung; Dept Urology, Erasmus MC, Rotterdam, the Netherlands

12:00-12:15  Fiber Architecture and Biaxial Mechanical Behavior of Porcine Urinary Bladder Extracellular Matrix # 5324
Thomas W. Gilbert, Donald O. Freytes, Andrew R. Willment, Michael S. Sacks, Stephen F. Badylak; McGowan Institute for Regenerative Medicine, Univ. of Pittsburgh, Pittsburgh, PA, USA

12:15-12:30  Toward a structural model of the urinary bladder wall #7502
Silvia Wognum and Michael S. Sacks; Dept. of Bioengineering, Univ. of Pittsburgh, Pittsburgh, PA, USA

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.11.2 Computational Biomechanics of the Spine
Session Organizers: Jacques M. Huyghe, Aboulfazl Shirazi-Adl
Tuesday August 1
Room R1.002

11:00-11:15  Optimum vertebral body shape and density for sustaining load with minimum mass #4527
Mehran Kasra; Dept. of Mechanical Engineering, McMaster Univ., Hamilton, Ontario, Canada

11:15-11:30  Finite element simulation for the prediction of mechanical failure in the lumbar spine surgery #7422
Thomas Mosnier a, Virginie Lafage a, Ludovic Rillardon b, Jean Duboussset a, Jaime Pratt e, Wafa Skalli a, Laboratoire de BioMécanique, Paris, France; a Hopital Beaujon, Clichy, France; Laboratoire de BioMécanique de Valencia, Spain
11:30-11:45 Development and Validation of a Three Dimensional Finite Element Model of Whole Cervical Spine #7066
Swapna Basa and Venkatesh Balasubramanian; Rehabilitation Bioengineering Group, Dept. of Biotechnology, IIT Madras, Chennai, India

11:45-12:00 Influence of Boundary Conditions on Failure Mechanisms of the Human Vertebral Body #6097
Senthil K Eswaran, Tony M Keaveny; Orthopaedic Biomechanics Laboratory, Univ. of California, Berkeley, CA, USA

12:00-12:15
12:15-12:30

Thread 2: Flow-Structure Interactions
Thread Organizers: Chris Bertram, Ross Ethier, Charlie Ellington

T2.1.1 Cardiovascular Mechanics -Heart valves and prostheses
Chair: Dalin Tang, Ajit Yoganathan

Tuesday August 1
Room R2.091

11:00-11:15 Validation of Fluid-Structure Interaction Models of a Mechanical Heart Valve and Flexible Heart Valve #6701
N. Forsythe a, J-D. Müller b, a School of Mechanical and Aerospace Engineering, Queen's Univ., Belfast, UK; b Dept. of Engineering, Queen Mary, Univ. of London, London, UK

11:15-11:30 A numerical fluid dynamics study of the concomitant presence of a prosthetic aortic valve and a subaortic stenosis #6384
Carine Guivier a, Valérie Deplano a, Philippe Pibaro b; a IRPHE UMR 6594, Equipe de Biomécanique Cardiovasculaire, Marseille, France; b Quebec Heart Institute, Laval Hospital, Sainte Foy, Canada

11:30-11:45 Simulating Prosthetic Heart Valve Hemodynamics in Realistic Aorta Anatomies #5851
Liang Ge a, Lakshmi P. Dasi b, Helene Simon a, Fotis Sotiropoulos a and Ajit Yoganathan b; a Saint Anthony Falls Laboratory, Univ. of Minnesota, Minneapolis, MN b Wallace H. Coulter Dept. of Biomedical Engineering, Georgia Institute of Technology and Emory Univ., Atlanta, GA; a School of Chemical and Biomolecular Engineering, Georgia Institute of Technology, Atlanta, GA

11:45-12:00 Simulation Of Fluid-Structure Interactions In Prosthetic Heart Valves Using A Sharp-Interface Approach #7834
H. S. Udaykumar, S. Vigmestad, S. Krishnan, B. Jeffrey and K. B. Chandran; The Univ. of Iowa, Iowa City, USA

12:00-12:15 Numerical investigation of the fluid and structure dynamics in models of impedance pump #5429
Idit Avrahami a, Laurence Loume b, and Morteza Gharib a,b; a Bioengineering and aeronautics, California Institute of Technology, Pasadena, California, United States

12:15-12:30 Image-Based RV/LV Combination Structure-Only and FSI Models for Mechanical Analysis of Human Right Ventricle Remodeling Surgery Design #4045
Dulin Tang a, Chun Yang b, Idith Haber b, Tal Geva b, Pedro J. del Nido b; a Mathematical Sciences Dept., Worcester Polytechnic Institute, Worcester, USA; b Mathematics Dept., Beijing Normal Univ., Beijing, China; b Harvard Medical School, Dept. of Cardiac Surgery, Children’s Hospital, Boston, USA

Company Presentation
13:00-13:45
Tuesday August 1
Room R0.056

Micro-fabrication of the non-moving-part valve micro-pump embossing technology
Ashley Pun, Derek Louiel, LM Li; Hong Kong Productivity Council

Tuesday Aug. 1
14:00-15:30

1. Bone Mechanics – Joint ESB Track
1.3 Bone as an Organ
Session Organizer /Chair: Marie Christine Hobatho
Tuesday August 1
Room R0.055

14:00-14:15  Bone as organ viewed as a biomechatronic system #5448
Ryszard Uklejewski a,d, Piotr Rogala b, Wanda Stryła c, Andrzej Kędzia a, Kazimierz Wielki
Univ. in Bydgoszcz, Institute of Technology, Dept. of Fundamentals of Medical Bioengineering, Bydgoszcz, Poland; b Poznań Univ. of Medical Sciences, Spine Surgery, Orthopedic and Traumatology Dept., Poznań, Poland; c Poznań Univ. of Medical Sciences, Rehabilitation Chair and Dept., Poznań, Poland; d Poznań Univ. of Medical Sciences, Dept. of Pediatric Endocrinology, Poznań, Poland

14:15-14:30  Fractal dimension as a parameter of bone architecture #7520
Anna Nikodem a, Romuald Bedzinski a, Marek Rybaczyk b and Szymon Dragan a
Biomedical Engineering and Experimental Mechanics Division Wroclaw Univ. of Technology, Poland; b Continual Media Mechanics Division Wroclaw Univ. of Technology, Poland; a Dept. of Trauma Treatment and Orthopedics Wroclaw Academy of Medicine, Poland

14:30-14:45  Femoral neck stiffness critically depends on loading direction #5768
Romain Voide, G. Harry van Lenthe, Ralph Müller
Institute for Biomedical Engineering, Univ. and ETH Zürich, Zürich, Switzerland

14:45-15:00  The mechanical effect of incorporating mineral distribution in FE models of developing trabecular bone #5668
Lars Mulder a, Jan Harm Koolstra a, Theo MGJ van Eijden b, Academic Centre for Dentistry Amsterdam, Universiteit van Amsterdam and Vrije Universiteit, Amsterdam, the Netherlands

15:00-15:15  Accurate prediction of strain values from subject specific finite element models of long bones #6620
Enrico Schileo a, Fulvia Taddei a, Benedikt Helgason b, Francesco Pallini c, Luca Cristofolini a, c, Marco Viceconti a, Laboratorio di Tecnologia Medica, Istituti Ortopedici Rizzoli, Bologna, Italy; b Faculty of Mechanical and Industrial Engineering, Univ. of Iceland, Reykjavik, Iceland; c Engineering Faculty, Univ. of Bologna, Italy

15:15-15:30  The use of rapid prototype models for investigation of failure mechanisms in trabecular bone # 6450
Pat Mc Donnell, Noel Harrison, Denis O’ Mahoney, Peter Mc Hugh, Stefan Lohfeld
National Centre for Biomedical Engineering Science and Dept. of Mechanical and Biomedical Engineering, National Univ. of Ireland, Galway, Ireland

2 Musculoskeletal Mechanics-Joint ISB Track
2.3.2 Motor Control of Human Movement  (Ankle And Foot)
Session Organizers /Chairs: W. I. Schoellhorn, Keith Davids
Tuesday August 1
Room R1.049

14:00-14:15  Locomotor Adaptation to a Robotic Ankle Exoskeleton Under Proportional Myoelectric Control of the Medial Gastrocnemius #5198
Catherine Kinnaird a and Daniel P. Ferris b, Movement Science and b Biomedical Engineering, Univ. of Michigan, Ann Arbor, USA

14:15-14:30  Adaptation to Varied Ankle-Foot Orthotic Resistance During Treadmill Walking # 5261
Prism S. Schneider a, James M. Wakeling a, Ron F. Zernicke a,c; a Research Laboratory of Sport, Exercise and Clinical Science, University of Calgary, Canada; b Corcelles Motion Laboratory, Royal Veterinary College, London, United Kingdom; c Schulich School of Engineering, Univ. of Calgary, Canada

14:30-14:45  Withdrawn

14:45-15:00  Locomotor adaptation to a powered ankle-foot orthosis: Comparison of footswitch control versus soleus proportional myoelectric control #7577

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2 Musculoskeletal Mechanics-Joint ISB Track

2.7.3 Musculoskeletal Modelling (Hip and Knee modeling)

Chairs: Maarten Bobbert, Ton van den Bogert

Tuesday August 1
Room R0.002

14:00-14:15 In Vivo Assessment of Hip Joint Mechanics Using a Mathematical Model, Control System Theory and Data Acquisition #5990
Diana Glaser a, Richard D. Komistek a,b, Harold E. Cates c; aUniv. of Tennessee, Knoxville, TN, USA; bOak Ridge National Laboratory, Oak Ridge, TN, USA; cTennessee Orthopaedics Clinic, Knoxville, TN, USA

14:15-14:30 Design of prosthetic devices by means of musculoskeletal models #7684
Marko Ackermann, Werner Schiehlen; Institute of Engineering and Computational Mechanics, Univ. of Stuttgart, Stuttgart, Germany

14:30-14:45 Muscle Forces Acting On the Skeleton during Gait: Data Fusion and Subject-Specific Muscle-Skeletal Modelling #6574
Laura Montanari a, Fulvia Taddei a, Paolo Martelli b, Alberto Leardini a, Marco Manfrini a, Marco Vicente a; aLaboratorio di Tecnologia Medica, bMovement Analysis Lab, cSkeletal Oncology Dept., Istituti Ortopedici Rizzoli, Bologna, Italy

14:45-15:00 Patient-Specific Simulation of Dynamic Stress Distribution in the Human Knee #7075
Peter Deuflhard a,d, Susanne Ertel a,d, Ralf Kornhuber b,d, Rolf Krause a, Oliver Sander a,d; aZuse Institute Berlin, Germany; bFreie Universität Berlin, Germany; cUniversität Bonn, Germany; dDFG Research Center MATHEON, Berlin, Germany

15:00-15:15 Sagittal plane loading contributes to gender differences in sports-related non-contact ACL injuries: Fact or fiction #7630
Scott McLean a,b, Xuemei Huang a, Ton van den Bogert a,b; aDept. of Biomedical Engineering, The Cleveland Clinic Foundation, Cleveland, USA; bThe Orthopaedic Research Center, The Cleveland Clinic Foundation, Cleveland, USA

15:15-15:30 Comparison of femoro-tibial contact forces measured in a telemetric implant to those predicted by mathematical modeling #5992
Sharma A a, Komistek RD a, Mahfouz, MR a, D’Lima DD b, Colewell CW Jr. b; aCenter for Musculoskeletal Research, Univ. of Tennessee, Knoxville, TN, USA; bScripps Clinic for Orthopedic Research and Education, La Jolla, CA, USA

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track

3.1.2.3 Knee

Session Organizers: Thomas P. Andriacchi, Fabio Catani

Tuesday August 1
Room R 0.005

14:00-14:15 Femoro-tibial and femoro-patellar 3D kinematics in patients with posterior cruciate ligament deficiency #7506
Alexander Howorka a, Anke Schützeberg a, Stefan Hinterwimmer b, Markus Siebert c, Thomas Vogt d, Heiko Graichen e, Rüdiger von Eisenhart-Roth e; aResearch Group for Biomechanics, Dept. of Orthopedic Surgery, Univer.-Frankfurt, Germany; bDept. of Surgery, Ludwig-Maximilians-Universität-Munich, Germany; cMedical Informatics, GSF-Neuherberg, Germany; dClinical and Interventional Radiology, Univ.-Frankfurt,Germany; eAsklepios-Orthopädische Klinik Lindenlohe, Germany
14:15-14:30 Validation of a novel non-invasive tracking system for measuring three dimensional knee laxity in vivo #6827
KR Boddu Siva Rama, P Cuomo, AMJ Bull, RW Thomas, AA Amis
Imperial College, London, UK

14:30-14:45 In vivo patellar tendon loading: Comparison between ultrasonic measurement and inverse dynamics #7434
Philippe Pourcelot, Antonie J. van den Bogert, Xuemei Huang, Nathalie Crevier-Denoix
aUMR INRA/ENVA Biomécanique et Pathologie Locomotrice du Cheval, Ecole Vétérinaire d’Alfort, France; bCleveland Clinic Foundation, USA

14:45-15:00 Biomechanical investigation of medial tibiofemoral joint space decompression after valgus opening-wedge high tibial osteotomy #5435
Christiane D. Wranz, Christoph Hurschler, Philipp Lobenhoffer, Jens D. Agneskirchner
aHenriettensstiftung, Dept. of Trauma and Reconstructive Surgery, Hannover, Germany; bHannover Medical School, Orthopaedic Dept., Hannover, Germany

15:00-15:15 Sport-specific joint angle effect on the correlations between isometric torque and jumping performance #5388
Elissavet Rousanoglou, Konstantinos Boudolos; Sport Biomechanics Lab, National & Kapodistrian Univ. of Athens, Athens, Greece

15:15-15:30 Knee joint stability estimation by hamstrings/ quadriceps femoris muscles torques ratios in range of movements #4216
Inese Pontaga; Latvian Academy of Sports Education, Riga, Latvia

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.1.3.3 Multiple Joints
Session Organizer/Chair: F. U. Niethard
Tuesday August 1
Room R0.007

14:00-14:15 In vivo Achilles tendon loading: Comparison between ultrasonic measurement and inverse dynamics #7007
Antonie J. van den Bogert, Philippe Pourcelot, Xuemei Huang, Nathalie Crevier-Denoix
aCleveland Clinic Foundation, Cleveland, USA; bUMR INRA/ENVA Biomécanique et Pathologie Locomotrice du Cheval, Ecole Vétérinaire d’Alfort, Maisons-Alfort, France

14:15-14:30 Invasive study of rearfoot, midfoot and forefoot kinematics during walking #6819
aC Nester, R Jones, A Liu, D Howard, A Lundberg, T Arndt, P Lundgren, A Stacoff, P Wolf; bCent. Rehabilitation & Human Performance, Univ. of Salford, UK; 3 Karolinska Univ. Hospital, Stockholm, Sweden; 4Univ. College of Physical Education and Sport, Stockholm, Sweden; 5Laboratory of Biomechanics, ETH Zurich, Switzerland

14:30-14:45 Importance of biarticular muscles on vertical squat jump performance #6238
Prokopow Przemysław Computational Biomechanics Unit, RIKEN, Japan

14:45-15:00 One Repetition Maximum Strength for Leg Press in Healthy Adults #7158
Chen-Yi Song, Pei-Chi Wu, Mei-Hwa Jan; School and Graduate Institute of Physical Therapy College of Medicine, National Taiwan Univ. , Taipei , Taiwan

15:00-15:15 Mechanical Plasticity in Gait is Associated with Increased Age But Not Decreased Strength # 5158
Paul DeVita, Patrick Rider, Allison Gruber, Joseph Helseth, Ken Steinweg, & Tibor Hortobagyi; Biomechanics Laboratory, Dept. of Exercise and Sport Science, East Carolina Univ., Greenville, NC, USA

15:15-15:30 Strict palpation guidelines of skeletal landmarks for more accurate data registration, data representation and data comparison #6872
Serge Van Sint Jan, Patrick Salvia, Victor Sholukha, Marcel Rooze; a, b Dept. of Anatomy, Université Libre de Bruxelles, Brussels, Belgium; 3 Dept. of Applied Mathematics, Polytechnical Univ., Saint Petersburg, Russia

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
Track Coordinators: Mark Grabiner, Günther Rau, Georg Duda
3.1.5.1 Upper Extremity Injury  
Session Organizer /Chair: James Ashton-Miller  
Tuesday August 1  
Room R1.046

14:00-14:15 Achievable changes in bone mineral density influence predicted distal radius fracture load #4297  
L. K. Troy, M. D. Grabiner; Univ. of Illinois at Chicago, Chicago, IL, USA

14:15-14:30 Rotational Stiffness and Damping Properties of the Elbow Extensor Muscles Under Impact in Young Men and Women #7289  
Anne Mathias, James A. Ashton-Miller; Biomechanics Research Laboratory, Univ. of Michigan, Ann Arbor, USA

14:30-14:45 Does Muscle Strength Explain the Gender Difference in Upper Extremity Kinematics While Arresting a Forward Fall? #7291  
Jia-Hsuan Lo, James A. Ashton-Miller; Biomechanics Research Laboratory, Univ. of Michigan, Ann Arbor, Michigan, USA

14:45-15:00 Effect of Movement Strategy on Injury Risk in Forward Falls from Standing Height: An Experimental Investigation in Young Males #7293  
Jia-Hsuan Lo, Anne Mathias, James Ashton-Miller; Biomechanics Research Laboratory, Univ. of Michigan, Ann Arbor, Michigan, USA

15:00-15:15 Matching the mechanics to the task: How endpoint stiffness influences arm posture selection #5223  
Eric J. Perreault,1,2 and Bing-Shiang Yang; 1Northwestern Univ., Chicago, IL, USA  
2Rehabilitation Institute of Chicago, Chicago, IL, USA

15:15-15:30 Moment-generating capacity of upper limb muscles #5457  
Katherine R. S. Holzbaur,1,2 Scott L. Delp,3,4 Wendy M. Murray; 1Bioengineering Dept., Stanford Univ., Stanford, CA, USA; 2Bone and Joint Center, VA Palo Alto HCS, Palo Alto, CA, USA

4. Implants for Trauma and Orthopedics-Joint ESB Track  
4.3.1 Knee Endoprosthetics - Computational Modeling and Mechanical Testing  
Chairs: Mark Taylor, Rainer Burgkart  
Tuesday August 1  
Room E1.03

14:00-14:15 Stress analysis of the all polyethylene tibial tray #4493  
Satoshi Matsuda, Todd D Stewart, Martin Stone, John Fisher; “Dept. of Mechanical and System Engineering, Univ. of Hyogo, Himeji, Japan; 3Institute of Medical and Biological Engineering, The Univ. of Leeds, Leeds, UK; 4Leeds General Infirmary, Leeds, UK

14:15-14:30 A computational model of a total knee replacement including patellar tendon and ligamentous structures #5220  
Javier Bayod, Estefania Peña, Miguel Angel Martinez, Manuel Doblaré; Group of Structures and Materials Modelling (GEMM), Aragón Institute of Engineering Research (I3A), Univ. of Zaragoza, Spain

14:30-15:00 Withdrawn

14:45-15:00 Kinematics of total knee replacement (TKR) patients versus knee simulator input data #7464  
Ngai, V, Schwenke, T, Andriacchi, TP, Wimmer, MA; 4Rush Univ. Medical Center, Chicago, IL, USA; 5Stanford Univ., Stanford, CA, USA

15:00-15:15 Simulation of a knee implanted with an interpositional spacer during a gait cycle using explicit finite element analysis #5100  
Sara Checa-Esteban, Andrew New; Univ. of Southampton, Southampton, UK

15:15-15:30 The effect on knee kinematics of variations in total knee replacement implantation #7696  
DJ Lucas, M Alam, O Kessler, AMJ Bull, AA Amis; "Imperial College London, UK; 5Stryker Europe, Thalwil, Switzerland

5. Occupational and Impact Injury Biomechanics  
5.4.1 Head/Brain Injury: Macro-Biomechanics  
Session Organizers: Susan Margulies, Karol Miller, David Meaney
Tuesday August 1
Room R0.058

14:00-14:15  Mechanisms of Head Injury for Restrained Pediatric Occupants #6769
Kristy B. Arbogast a, b, Rajiv A. Menon a, Prashant Jain a, Yoganand Ghatia a, b
Center for Injury Research and Prevention, The Children’s Hospital of Philadelphia, Philadelphia, PA, USA; a, b
The Univ. of Pennsylvania School of Medicine, Philadelphia, PA, USA

14:15-14:30  Development and Validation of the Head Impact Telemetry System™ for use in Amateur Boxing #6511
Jonathan G. Beckwith, Jeffrey J. Chu, Richard M. Greenwald; Simbex, Lebanon, New Hampshire, USA

14:30-14:45  Head Impact Telemetry System™ for Measurement of Head Acceleration in Ice Hockey #6512
Joseph T. Gwin, Jeffery J. Chu, Richard M. Greenwald; Simbex, Lebanon, New Hampshire, USA

6. Sport Biomechanics-Joint ISB Track
6.1.4.2 Rehabilitation Orthopaedics
Session Organizers: Hubert Hörterer, Roland Biedert
Tuesday August 1
Room D2.12

14:00-14:15  Sports Ability-What Does that Mean?
R. Biedert

14:15-14:30  Overuse
K. Warnke

14:30-14:45  Sport after Joint Replacement
H. Hörterer

14:45-15:00  Athlete’s Knee—Rehabilitation Possibilities with Hydrotherapy
A. Wicker

15:00-15:15  Importance of strengthening of biarticular muscles in a vertical jump# 6388
Prokopow Przemysław; Computational Biomechanics Unit, RIKEN, Wako-Shi, Japan

10. Cellular and Molecular Mechanics
10.3.2 Cell Migration and Molecular Motors
Session Organizers: Matt Lang, Dan Hammer
Tuesday August 1
Room G0.43

14:00-14:15  Long range correlation of force fluctuation in an endothelial cell layer #6838
Daniel Paranhos Zitterbart, Claudia T. Mierke, Ben Fabry; Center for Medical Physics and Technology, Biophysics Group, Univ. Erlangen, Germany

14:15-14:30  Force Generated by the Isolated Smooth Muscle Cell in a Three-Dimensional Collagen Gel #6873
Koch, T.M. a, Nguyen, T.T.B. b, Pauli, J. a, Mierke, C. a, Butler, J.P. b, Fredberg, J.J. b, Fabry, B. a
a Biophysics group, Univ. of Erlangen-Nuremberg, Germany; b Physiology Program, Harvard School of Public Health, Boston, MA, USA

14:30-14:45  Non-linear elasticity of growing actin networks #7006
Ovijit Chaudhuri, Sapun Parekh, Daniel A. Fletcher; Bioengineering Dept., UC Berkeley, Berkeley, CA, USA

14:45-15:00  Reversible Ratchet in Closed Systems #7264
Alfio Grillo a, Salvatore Federico b, Rachid Ait Haddou b, Gaetano Giaquinta a, Walter Herzog b
a Dept. of Physical and Chemical Methodologies for Engineering, Univ. of Catania, Italy; b Human Performance Laboratory, The Univ. of Calgary, Canada

15:00-15:15  Myosin II inserts into lipid membranes #5128
11. Artificial Organs

11.2.1 Cardiac Assist Devices

Session Organizers /Chair: Heinrich Schima, Setsuo Takatani

Tuesday August 1

Room R1.001

14:00-14:15 Technical Risk of Cardiac Assist Devices and their peripherals #6564
H. Schima\textsuperscript{a,b,c}, P. Zrunek\textsuperscript{b}, Z. Deckert\textsuperscript{b}, L. Huber\textsuperscript{b,c}, M. Vollkron\textsuperscript{b}, W. Röthy\textsuperscript{b}, D. Zimpfer\textsuperscript{b}, G. Wieselthaler\textsuperscript{b,c}; \*Center of Biomed Engineering and Physics, \*Dept. of Cardiothoracic Surgery and \*LBI for Cardiosurg. Research, Med. Univ. Vienna, Austria

14:15-14:30 VERSUS (Ventricular Recovery Support System) Status update August 2006 #5691
P.B. Kwanta, T. Finocchiaroa, U. Steinseifera, M. Verkroostb, R. Brouwerb, G. Rakhorstc, T. Schmitz-Rodec; \*Helmholtz Institute Aachen, RWTH, Aachen, Germany
\textsuperscript{b}Univ. Medical Centre Nijmegen, The Netherlands
\textsuperscript{c}Univ. of Groningen, The Netherlands

14:30-14:45 The PediPump\textsuperscript{TM}: A Versatile, Implantable Pediatric Ventricular Assist Device #7184
Brian W. Duncan, M.D. \textsuperscript{a,b}, Michael W. Kopcak, B.A. \textsuperscript{b}, David T. Dudzinski, B.S.\textsuperscript{b}, Angela M. Noecker, B.S.\textsuperscript{b}, Kiyotaka Fukamachi, M.D., Ph.D.\textsuperscript{b}, William A. Smith, D.Eng.\textsuperscript{b}
\textsuperscript{a}Pediatric and Congenital Heart Surgery, Children’s Hospital, Cleveland Clinic, USA; \textsuperscript{b}The Dept. of Biomedical Engineering, The Lerner Research Institute, Cleveland Clinic, USA

14:45-15:00 Initial In Vitro and In Vivo Performance Results for the Pediatric Cardiopulmonary Assist System (pCAS) # 7021
George Pantalosa, Constantine Ionan\textsuperscript{a}, Jeff Colyer\textsuperscript{a}, Steven Koenig\textsuperscript{a}, Michael Mitchell\textsuperscript{a}, Erle Austin III\textsuperscript{b}, Jeff Speaman\textsuperscript{b}, Chris Lucib, Greg Johnson\textsuperscript{b}, and Mark Gartner\textsuperscript{b}
\textsuperscript{a}Univ. of Louisville, Louisville, Kentucky, USA; \textsuperscript{b}Ension Inc., Pittsburgh, Pennsylvania, USA

15:00-15:15 Optimization Of Ventricle-Shaped Chambers For the Implantable DLR Assist Device #7609
T. Schmid\textsuperscript{a}, W. Schiller\textsuperscript{b}, K. Spiegel\textsuperscript{b}, M. Stock\textsuperscript{a}, D. Liesch\textsuperscript{b}, G. Hirzinger\textsuperscript{b}, H. Oertel\textsuperscript{b}, A. Welz\textsuperscript{b}; \*Institute of Robotic Systems, DLR, Wessling, Germany, \*Chair of Fluid Mechanics, Technical Univ. Munich, Germany; \*Heart Surgery Clinic, Univ. of Bonn, Germany, \*Institute of Fluid Mechanics, Univ. of Karlsruhe, Germany

15:15-15:30 Pid Vs Fuzzy Logic Control For The New Adaptive Transcutaneous Energy Transfer System (Tet) For Implantable Devices # 7661
B. Vodermayer\textsuperscript{a}, R. Gruber\textsuperscript{a}, T. Schmid\textsuperscript{b}, W. Schiller\textsuperscript{b}, G. Hirzinger\textsuperscript{b}, D. Liesch\textsuperscript{b}, A. Welz\textsuperscript{b}
\textsuperscript{a}Institute of Robotic Systems, German Aerospace Center (DLR), Munich, Germany; \textsuperscript{b}Heart Surgery Clinic, Univ. of Bonn, Germany; \*Institute for Biotechnic, Munich, Germany

14. Cardiovascular Mechanics

14.3.3 Hemodynamics of Veins

Session Organizer: Niko Stergiopulos

Chairs: F. van de Vosse, S. Rittgers

Tuesday August 1

Room G0.01

14:00-14:15 A modelling framework to predict haemodynamics in the deep veins of the calf during external intermittent compression therapy #4771
Narracott, AJ\textsuperscript{a}, Lawford PV\textsuperscript{a}, Zervides C\textsuperscript{a}, John, GW\textsuperscript{b}, Woodcock, JP\textsuperscript{b}, Morris, RJ\textsuperscript{b} Hose DR\textsuperscript{a}
\textsuperscript{a}Medical Physics, Univ. of Sheffield, Sheffield, UK; \textsuperscript{b}Medical Physics and Bioengineering, Cardiff Univ., Cardiff, Wales, UK
14:15-14:30  The endothelial and vein wall reaction on pulsatile flow and shear stress from arterial 'jets' originating from ArterioVenous Anastomoses(AVAs) studied by Scanning Electron Microscopy(SEM) #5315
L. Schalin a, D. Liepsch b; a) Inst. of Anatomy, BMC, Univ. of Uppsala, Sweden
b) Laboratory of Biofluid Mechanics, Fachhochschule München, Germany

14:30-14:45  Vascular access surgery for hemodialysis: postoperative flow prediction with a lumped-parameter model #5357
Wouter Huberts a, Marièlle Bosboom a, Nils Planken b, Xavier Keuter b, Jan Tordoir b, Frans van de Vosse c; a) Dept. of Biomedical Engineering, Eindhoven Univ. of Technology and b) Dept. of Surgery, Univ. Hospital Maastricht, The Netherlands

14:45-15:00  Effects Of Venous Needle Flow During Hemodialysis On Endothelial Morphology And Nitric Oxide Formation #5502
Thanh Huynh 1, Balu Chacko 2, Xinjun Teng 2, Michael Allon 3, Brigitta Brott 4, Rakesh P Patel 2, and Andreas Anayiotos 1; 1 Biomedical Engineering Dept., Univ. of Alabama at Birmingham, Birmingham, USA; 2 Pathology Dept., Center for Free Radical Biology, Univ. of Alabama at Birmingham, Birmingham, USA; 3 Nephrology Dept., Univ. of Alabama at Birmingham, Birmingham, USA; 4 Cardiovascular Disease Dept. Univ. of Alabama at Birmingham, Birmingham, USA

15:00-15:15  Development of a Prosthetic Venous Valve #6048
Stanley Rittgers and Matt Oberdier; The Univ. of Akron, Akron, Ohio, USA

15:15-15:30  Accessory veins and native arteriovenous fistula non-maturation: to clip or not to clip that is the question #6245
Frans van de Vosse a, Nils Planken b, Wouter Huberts a, Marièlle Bosboom a, Xavier Keuter b, Jan Tordoir b; a) Dept. of Biomedical Engineering, Eindhoven Univ. of Technology, and b) Dept. of Surgery, Univ. Hospital Maastricht, The Netherlands

14. Cardiovascular Mechanics

14.5.1 Congenital cardiovascular disease applications

Session Organizers and Chairs: Charles A. Taylor, Francesco Migliavacca
Tuesday August 1
Room G2.36

14:00-14:30  Keynote: Congenital cardiovascular disease applications #7765
Philip Kilner; Royal Bromton Hospital, CMR Unit, London, UK

14:30-14:45  Fluid dynamics in patient-specific models of cavopulmonary connections #6581
Giancarlo Pennati a, Laura Socci a, Francesca Gervaso b, Gabriele Dubini b, Pierluigi Festa b
Vincenzo S. Luisi a, Francesco Migliavacca a; a) LaBS, Structural Engineering Dept., Politecnico di Milano, Milan, Italy; b) Institute of Clinical Physiology, CNR, Pisa, Italy; c) Ospedale “G. Pasquinoucci”, Massa, Italy

14:45-15:00  Progress towards surgical planning of the total cavopulmonary connection #6100
Diane de Zélicourt a, Kerem Pekkan a, Kartik Sundareswaran b, Hiroumi Kitajima a, Jarek Rossignac b, James Parks c, Shiva Sharma c, Kirk Kanter d, Mark Fogel d, and Ajit P. Yoganathan a
a) Wallace H. Coulter Dept. of Biomedical Engineering, Georgia Institute of Technology & Emory Univ., Atlanta, USA; b) College of Computing, Georgia Institute of Technology, Atlanta, USA; c) Pediatric Cardiology, Emory Univ., Atlanta, USA; d) Dept. of Surgery, Emory Univ., Atlanta, USA; e) Division of Cardiology, The Children's Hospital of Philadelphia, Philadelphia, USA

15:00-15:15  Computational fluid dynamics estimation of hemodynamic alterations and indices of morbidity in aortic coarctation patients during moderate exercise #6692
J.F. LaDisa a, C.A. Figueroa b, I.E. Vignon-Clementel c, F.P. Chan a, J.A. Feinstein a, C.A. Taylor d
a) Depts. of Pediatrics, b) Mechanical Engineering, c) Radiology, d) Bioengineering, Stanford Univ., Stanford, California, USA

15:15-15:30  Effects of exercise and respiration on the hemodynamic efficiency of the total cavopulmonary connection #7038
Alison L. Marsden a, Irene E. Vignon-Clementel b, Jeffrey A. Feinstein a and Charles A. Taylor a, a) Depts. of Pediatrics, b) Dept. of Mechanical Engineering, c) Depts. of Bioengineering and Surgery, Stanford Univ., Stanford, CA, USA

14. Cardiovascular Mechanics
14.10.2 Large Vessel Fluid Mechanics-Implants and Devices
Session Organizers /Chairs: Hans-Henning Eckstein, Hermann Berger
Tuesday August 1
Room G1.27
14:00-14:15 Computational Investigation of a Multilayer Impedance Pump to Serve as a Long-Term Intra-Aortic Pump #5183
Laurence Loumessa, Idit Avrahamib and Morteza Ghariba,b, Aeronautics and bBioengineering, California Institute of Technology, Pasadena, California, United States

14:15-14:30 A numerical acoustic fluid-structure model of a therapeutic ultrasound angioplasty device #5136
Graham P. Gavina, Saleem Hashmia, Finbar Dolanb and Garrett B. McGuinnessa
a School of Mechanical and Manufacturing Engineering, Dublin City Univ., Dublin, Ireland; b Medtronic Vascular, Galway, Ireland

14:30-14:45 Simulation of a mechanical approach to treat aortic dissection #5853
Romano Zannoli, Ivan Corazza, Angelo Branzi; Institute of Cardiology, Univ. of Bologna, Italy

14:45-15:00 The influence of a convergent nozzle on the flow field of a mild stenosis located in a T-junction #5579
Ch. Ch. Christofidis, T. G. Papaioannou, D. S. Mathioulakis; Fluids Section, School of Mechanical Engineering, National Technical Univ. of Athens, Greece

15:00-15:15 Computer-Controlled Physiological Blood Flow Simulator #7682
Nasser Fatouraee, M. Hossein Moosavi and Ali Pashaee; Biological Fluid Mechanics Laboratory, Biomedical Engineering Faculty, Amirkabir Univ. of Technology, Tehran, Iran

14. Cardiovascular Mechanics
14.13.5 Vascular Wall Mechanics-Mechanobiology of aneurysms
Session Organizers /Chairs: Gerhard Holzapfel, Takeo Matsumoto
Tuesday August 1
Room R1.004
14:00-14:30 Keynote: Growth and stability of cerebral aneurysms #4291
J.D Humphrey, S. Baek, K.R. Rajagopal; Biomedical and Mechanical EngineeringTexas A&M Univ., College Station, TX - USA

14:30-14:45 A multi-mechanism model for aneurysm wall enlargement and remodeling #6997
Rachmadian Wulandanaa, Anne M. Robertsonb; aDept. of Biomedical Engineering, Georgia Tech/Emory Univ., Atlanta, GA, USA; bDept. of Mechanical Engineering, Univ. of Pittsburgh, Pittsburgh, PA, USA

14:45-15:00 Variations in Wall Thickness and Material Stiffness Make Intracranial Aneurysms Vulnerable #4451
Vinay Challa, Hai-Chao Han; Dept. of Mechanical Engineering, Univ. of Texas at San Antonio, San Antonio, Texas

15:00-15:15 Simple method for evaluating the mean wall stress in an abdominal aortic aneurysm based on a loaded geometry: Effect of wall thickness #5648
Hiroshi Yamada and Yuichi Hasegawa; Dept. of Biological Functions and Engineering, Graduate School of Life Science and Systems Engineering, Kyushu Institute of Technology, Kitakyushu, Japan

15:15-15:30 Dynamic Mechanical Properties of a Computational Model of an Evolving Abdominal Aortic Aneurysm #5651
P.N. Watton, N.A. Hill; Dept. of Mathematics, Univ. of Glasgow, Glasgow, UK

15:30-15:45 In vivo model to correlate complex geometries with hemodynamics associated with cerebral aneurysm development #6339
Hui Menga,b,c, Danial D Swarta,k,c, ZhiJie Wanga,b, Yiemeng Hota,b, John Kolegd, Eleni Metaxaa,b, Michael P Szymanskia,b, Ling Gaoa,b, Ann Marie Paciorekek, Junichi Yamamotoe, Eric Sauvageaue, Elad I Levyf, L. Nelson Hopkinsa,c, “Toshiba Stroke Research Center, ”Dept.
15. Microcirculation

15.4 Microvascular Glycocalyx and Molecular Fluid Structure Interaction

Session Organizers: Timothy Secomb, Edward Damiano

Tuesday August 1
Room R.1.006

14:00-14:15  
Microrheological assessment of the viscoelastic properties of the endothelial glycocalyx in cremasteric capillaries of living mice #7840
Nadja Nijenhuis a, Christoph F. Schmidt b, Jos A.E. Spaan a, Jurgen W.G.E. VanTeeffelen a, Hans Vink c; aMedical Physics, Academic Medical Center, Univ. of Amsterdam, Netherlands; bPhysics and Astronomy, Vrije Universiteit, Amsterdam, Netherlands

14:15-14:30  
Estimation of rheologically effective endothelial surface layer thickness from blood flow distributions observed in microvascular networks #6287
Timothy W. Secomb a, Axel R. Pries b; aDept. of Physiology, Univ. of Arizona, Tucson, AZ, USA; bCharité - Universitätsmedizin Berlin, Campus Benjamin Franklin, Dept. of Physiology, Berlin, Germany

14:30-14:45  
An associating macromolecular model for the endothelial surface layer #7569
Darina Danova-Okpetua, Gary S. Grestb, and James L. Harden c; aDept. of Physics, Vrije Universiteit, Amsterdam, Netherlands; bSandia National Laboratories, Albuquerque, NM, USA; cDept. of Physics, Univ. of Ottawa, Ontario, Canada

14:45-15:00  
A “bumper car” model for the transmission of fluid shear stress to the actin cytoskeleton and the role of the glycocalyx #4124
Sheldon Weinbaum a, Mia Mia Thib b, John Tarbell b; aDept. of Biomedical Engineering, The City College of New York, USA; bDept. of Neuroscience, Albert Einstein College of Medicine, New York, USA

15:00-15:15  
Using fluorescent micro-particle image velocimetry to interrogate the surface glycocalyx on cultured endothelial cells in collagen microchannels #7726
D. Potter, J. Tien, E.R. Damiano; Boston Univ., Boston, USA

15:15-15:30  
Permeability of colloidal particles in a fiber matrix #4176
X.Y. Chen a, b, Y. Liua and J.M. Yang b; aDept. of Mechanical Engineering, The Hong Kong Polytechnic Univ., Hung Hom, Kowloon, Hong Kong; bSchool of Engineering, Univ. of Science and Technology of China, Hefei, China

15:30-15:45  
Components of the endothelial cell glycocalyx mediate mechanotransduction #4117
Manolis Y. Pahakis, Jason R. Kosky, and John M. Tarbell; Dept. of Biomedical Engineering, The City College of New York, New York, NY, USA

16. Reproductive Biomechanics

16.7 Sperm Propulsion

Session Organizer /Chairs: Lisa Fauci, David Woolley

Tuesday August 1
Room R.0.006

14:00-14:30  
Keynote: Sperm motility: a re-emphasis on hydrodynamics #6264
David Woolley; Dept. of Physiology, School of Medical Sciences, Univ. of Bristol, UK

14:30-14:45  
The Geometric Clutch as a working hypothesis for future research #6083
Charles B. Lindemann; Dept. of Biological Sciences, Oakland Univ., Rochester, Michigan, U.S.A

14:45-15:00  
Fluid dynamic models of flagellar and ciliary beating with viscoelasticity #7922
Robert Dillon a, Zingzhou Yang b, Lisa Fauci b; aDepartment of Mathematics, Washington State University, Pullman, WA, USA; bDepartment of Mathematics, Tulane University, New Orleans, LA, USA

15:00-15:15  
Flagellar axonemes: the motile machinery of sperm for the movement in micro-environmental field #7737
Kazuo Inaba; Shimoda Marine Research Center, Univ. of Tsukuba, Japan

15:15-15:30  
Fluid dynamic models of flagellar and ciliary beating #7186
17. Biomechanics in Nature

17.4.2 Swimming and Flying

Session Organizers: Johann von Leeuwen, Charlie Ellington

Chairs: Malcolm Gordon, Johann von Leeuwen

(Incorporating presentations from Thread 2: Flow-Structure Interaction; Thread Organizers: Chris Bertram, Ross Ethier; Charlie Ellington)

Tuesday August 1

Room R1.087

14:00-14:15 Swimming in larval fish: can hydrodynamics explain why larvae switch gait? #5149
U.K. Müller a, H. Liu b, S. van Duin a and J.L. van Leeuwen a
a Experimental Zoology, Wageningen Univ., Wageningen, The Netherlands
b Dept. of Electronics and Mechanical Engineering, Chiba Univ., Chiba, Japan

14:15-14:30 Escaping Flatland: Three-dimensional kinematics and hydrodynamics of median fins in fishes #5227
Eric D. Tyltell a, Emily M. Standen b, and George V. Lauder b; a Dept. of Biology, Univ. of Maryland, MD, USA; b Dept. of Organismic and Evolutionary Biology, Harvard Univ., Cambridge, MA, USA

14:30-14:45 Lagrangian methods for the analysis of animal wake dynamics #4127
John O. Dabiri, Jifeng Peng, Morteza Gharib; Graduate Aeronautical Laboratories and Bioengineering, California Institute of Technology, Pasadena, CA, USA

14:45-15:00 Biorrhobic insights into how animals swim # 5824
Promode R. Bandyopadhyay, David N. Beal and Alberico Menozzi; Autonomous Systems and Technology Dept., Naval Undersea Warfare Center, Newport, USA

15:00-15:15 Propulsive Performance of Biologically-Inspired Flapping Foils at High Reynolds Numbers #5513
Alexandra Techet; Massachusetts Institute of Technology, Dept. of Mechanical Engineering, Cambridge, MA, USA

15:15-15:30 Passive and active mechanisms for trim control in swimming fishes #6120
Malcolm Gordon, Dean Lauritzen, and Alexis Wiktorowicz; Dept. of Ecology and Evolutionary Biology, Univ. of California, Los Angeles, CA, USA

18. Trends in Cranial and Spinal Biomechanics

18.7 Car Racing and Craniovertebral Trauma

Session Organizer /Chair: Mineo Kawasaki Hubert Gramling

Tuesday August 1

Room R2.007

14:00-14:15 Development of Airbag and HANS Head and Neck Support for FIA Formula One #7708
Hubert Gramling a, Robert Hubbard b; a FIA Institute for Motor Sport Safety, Paris, France; b Michigan State Univ., East Lansing, Michigan, USA

14:15-14:30 Assessment of the Injury Risk from Airbag - Helmet Interaction #7707
Hubert Gramling, FIA Institute for Motor Sport Safety, Paris, France

14:30-14:45 HANS Head and Neck Support for Racing — Performance Update #7004
Robert Hubbard a, Hubert Gramling b; a Michigan State Univ., East Lansing, Michigan, USA; b FIA Institute, Stuttgart, Germany

14:45-15:00 Heat stress in motorsports racing # 7627
C. Meistelman a, G. Savourey b, Y. Besnard a; a Dept of Anaesthesia, Hôpital de Brabois, La Tronche, France; b Centre de recherche du service de santé des armées, La Tronche, France
19. Biotransport
19.2 Transport across blood vessel walls I
Session Organizer: David Rumschitzki
Tuesday August 1
Room R0.003

14:00-14:15 Changes with age in the pattern of high-permeability foci in the rabbit aortic endothelium near branch points #7782
Stephanie G Cremers, Peter D Weinberg; Dept. of Bioengineering, Imperial College, London, UK

14:15-14:30 A model of Intimal hyperplasia & mechanical forces #5036
M.E. Goodman*, N.A. Hill*, X.Y. Luo*; * Dept. of Mechanical Engineering, The Univ. of Sheffield, Sheffield, UK; * Dept. of Mathematics, The Univ. of Glasgow, Glasgow, UK

14:30-14:45 Effects of shear-dependent transport properties on mass transfer in stenosed arteries #4445
Nanfeng Sun*, Nigel B Wood*, Alun D Hughes*, Simon A Thom*, Xiao Y Xu*; * Dept. of Chemical Engineering, *NHLI, International Centre for Circulatory Health, St Mary’s Hospital, Imperial College London, UK

14:45-15:00 Investigation of Pulsatile Mass Transport in the Downstream Graft/Artery Junction of Peripheral Bypass Grafts #4799
Paul D Devereux, Thomas P O’Brien, Michael T Walsh and Tim M McGloughlin Centre for Applied Biomedical Engineering Research, Dept. of Mechanical and Aeronautical Engineering and The Materials and Surface Science Institute, Univ. of Limerick, Limerick, Ireland

15:00-15:15 eNOS and Ca²⁺ production in Arterial Geometries: an integrated fluid mechanics/cell model #4542
Andrew Comerford, Michael Plank, Tim David; Centre for Bioengineering, Univ. of Canterbury, Christchurch, NZ

15:15-15:30 Numerical modelling of macromolecular transport in a realistic moving model of the right coronary artery #7445
Maheshwaran K Kolandavel*, Ernst-Torben Fruend*, Steffen Ringgaard*, Peter G Walker*; *School of Mechanical Engineering, Univ. of Leeds, Leeds, UK; *Institute of Clinical Medicine and MR Research Centre, Skejby Hospital, Aarhus, Denmark

20. Biomechanics of Organs
20.4 Soft Tissues
Session Organizer /Chair: Victor Barocas
Tuesday August 1
Room R1.008

14:00-14:15 Growing shells #5326
A. DiCarlo*, V. Sansalone*, A. Tatone*, V. Varano*, * Università degli Studi “Roma Tre”, Roma, Italy; * Pôle Universitaire Léonard de Vinci, Paris, France; * Università degli Studi di L’Aquila, L’Aquila, Italy

14:15-14:30 Bio aoustical and bio mechanical methods for mechanical study of soft tissues #4194
Didier Laux*, Audrey Leydier*, Jean-Yves Ferrandis*, Jérôme Mathieu*, Karim Hnia*; * Laboratoire d’Analyse des Interfaces et de Nanophysique UMR5011 Université Montpellier II, Montpellier, France; *Laboratoire de Physiologie des Interactions - EA 701 Institut de Biologie Université de Montpellier, Montpellier, France

14:30-14:45 Biomechanical remodeling of obstructed guinea pig jejunum with reference to the zero-stress state #5020
Jian Yang, Jingbo Zhao, Donghua Liao, Peter Kunwald, Hans Gregersen; Center of Visceral Biomechanics and Pain, Aalborg Hospital; Aalborg, Denmark

This session has been moved from an earlier time slot.
Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.2.2. Computational Biomechanics of Arteries in Health and Disease
Session Organizers: Krishnan B. Chandran, David A. Vorp
Tuesday August 1
Room R2.091

14:00-14:15  Hybrid approach to the global circulation modeling #4353
Alexander S. Kholodov, Sergey S. Simakov; Depramet of Applied Mathematics, Moscow Institute of Physics and Technology, Moscow, Russia

14:15-14:30  Multi–Scale Oxygen Diffusion and Transport in the Cerebral Micro–vasculature #4876
Constantinos Hadjistassou, Keri Moyle, Yiannis Ventikos; Fluidics and Biocomplexity Group & Inst. of Biomedical Engineering, Dept. of Engineering Science, Univ. of Oxford, U.K.

14:30-14:45  Effects of local geometry on the fluid dynamics of coronary artery segments with implanted stents #5328
Vigmostad, S. a, Wahle, A. b, Olszewski, M. E b, Rossen, J. D. c, Sonka, M. b, and Chandran, K. B. a, Depts. of Biomedical Engineering, b Electrical and Computer Engineering and c Internal Medicine, The Univ. of Iowa, USA

14:45-15:00  Numerical study of pulsatile flow in composite arterial coronary grafts #5757
A.K. Politis a, G.P. Stavropoulos b, F.G. Panagopoulos a, N.S. Vlachos c and N.C. Markatos a, School of Chemical Engineering, National Technical Univ. of Athens, Greece; b Dept. of Cardiac Surgery, Henry Dunant Hospital, Athens, Greece; c Dept. of Mechanical & Industrial Engineering, Univ. of Thessaly, Volos, Greece

15:00-15:15  Fluid mechanical perturbations induced by stent implantation: a numerical study #6205
Rossella Balossino, Francesca Gervaso, Francesco Migliavacca, Gabriele Dubini; Laboratory of Biological Structure Mechanics, Structural Engineering Dept., Politecnico di Milano, Milan, Italy

15:15-15:30  Computation of blood flows in arteries – predictive modelling of surgical procedures #7458
Gavin Tabor, Philippe Young, Florian Pierron; a School of Engineering, Computer Science and Mathematics, Univ. of Exeter, Exeter, UK; b Simpleware Ltd, Exeter, UK

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.13 Computational modelling of the gastrointestinal tract
Session Organizer: Hans Gregersen
Tuesday August 1
Room R1.002

4:00-14:30  Keynote Discoveries of Gastric Function with a Lattice Boltzmann Model of the Human Stomach #6200
James G. Brasseur a, Anupam Pal a, Bertil Abrahamsson b; a Dept. of Mechanical Engineering, The Pennsylvania State Univ., USA; b AstraZeneca, Mölndal, Sweden

14:30-14:45  Computational Analysis of Mixing and Transport in the Proximal Duodenum
H. S. Udaykumar a, S. Krishnan, S. Dillard and K. Schulze; a Department of Mechanical and Industrial Engineering; b VA Medical Center and UIHC, University of Iowa, Iowa City, USA

14:45-15:00  Finite element analysis of gastric wall movements caused by antral contractions #4763
Donghua Liao, Hans Gregersen; Center of Visceral Biomechanics and Pain, Aalborg Hospital, Aalborg, Denmark

15:00-15:15  Towards a multiscale model of colorectal cancer #4634
O. E. Jensen, I. M. M. van Leeuwen, G. R. Mirams, A. Walter, J. R. King and H. M. Byrne; Centre for Mathematical Medicine, School of Mathematical Sciences, Univ. of Nottingham, Nottingham, UK

15:15-15:30  Modeling of human intestine mechanical properties and anastomosis stresses #6379
R.A.Turusov a, S.Stoytchev b, L.Hadjikov c, V.I.Egorov d; a Russian Academy of Sciences, Moscow, Russia; b Bulgarian Academy of Sciences, Sofia, Bulgaria; c Vishnevskiy Institute, Russian Academy of Medical Sciences, Moscow, Russia

15:30-15:45  Electromechanical wave activity in the stomach #4033
Roustem Miftahof; Division of Applied Mathematics, Korea Advance Institute of Science and Technology, Korea
Thread 2: Flow-Structure Interactions
T2.2 Respiratory Mechanics FSI- Aerodynamics and vibrations
Chairmen: Matthias Heil, Chris Bertram
Tuesday August 1
Room R2.088

14:00-14:15 Alveolar flow simulations during rhythmical breathing motion in reconstructed XTM acinar airspaces #4487
Josué Szniłman, Fabian Heimsch, David Altorfer, Johannes C. Schittny and Thomas Rösgen; a Institute of Fluid Dynamics, ETH Zurich, Switzerland; b Dept. of Computer Science, ETH Zurich, Switzerland; c Institute of Anatomy, Univ. of Berne, Switzerland

14:15-14:30 Fluid-structure interaction in Obstructive Sleep Apnea: validation of numerical simulations using in-vitro measurements #5944
F. Chouly a,b, A. Van Hirtum a,b, P.Y. Lagrée a, X. Pelorson b and Y. Payan a
a Laboratoire TIMC, UMR CNRS 5525, La Tronche, France; b Institut de la Communication Parlée, UMR CNRS Q5009, Grenoble, France; c Laboratoire de Modélisation en Mécanique, UMR CNRS 7607, Paris, France

14:30-14:45 An Acoustic Study on the Wave Speed Mechanism of Flow Limitation Through a Flexible Channel #6170
Lixi Huang; Dept. of Mechanical Engineering, The Hong Kong Polytechnic Univ., Hong Kong, China

14:45-15:00 Mechanisms of Inspiratory and Expiratory flow limitations during obstructive sleep apnoea #6609
Redouane Fodil, Céline Croce, Frédéric Lofaso, Bruno Louis, Daniel Isabey; a INserm UMR 651, Equipe Biomécanique Respiratoire, Université Paris XII, Créteil, France; b Service des Explorations Fonctionnelles, Hôpital R. Poincaré, Garches, France

15:00-15:15 Three-dimensional flows in rapidly oscillating vessels #5004
M. Heil a and S. L. Waters b; a School of Mathematical Sciences, Univ. of Nottingham, Nottingham, UK

15:15-15:30 Glottal jet structure measured in a scaled-up model #6118
Michael Krane, Michael Barry, Timothy Wei; a Rutgers Univ., Piscataway, NJ, USA
b Rensselaer Polytechnic Univ., Troy, NY USA

ESEM 4th International Symposium on Microdamage
Tuesday August 1
Room R1.003

14:00-14:15 Noise-Enhanced Response Of Bone Cells To Fluid Shear Stress #5955
R.G. Bacaba, J.J.W.A. Van Loona, T.H. Smits, J. Klein-Nulend; a Dept Oral Cell Biology, ACTA-Vrije Universiteit, Amsterdam, The Netherlands; b Dept of Biomedical Engineering, Vrije Universiteit, Amsterdam, The Netherlands; c Dept of Physical and Medical Technology, VU Medisch Centrum, Amsterdam, The Netherlands

14:15-14:30 Osteocyte Function In Microcrack Detection #6234
Jan G. Hazenberg, David Taylor, T. Clive Lee; a Dept. of Anatomy, Royal College of Surgeons in Ireland, Dublin, Ireland; b Trinity Centre for Bioengineering, Trinity College, Dublin, Ireland

14:30-14:45 Development of a novel three-dimensional culture system to study the role of mechanically damaged osteocytes in the initiation of targeted bone remodeling #4332
Terhi J. Heino, Kosaku Kurata, Hidehiko Higaki and H. Kalervo Väänänen
a Dept. of Anatomy, Institute of Biomedicine, Univ. of Turku, Finland; b Dept. of Biorobotics, Faculty of Engineering, Kyushu Sangyo Univ., Japan; c Dept. of Mechanical Engineering, Faculty of Engineering, Kyushu Sangyo Univ., Japan

14:45-15:00 Microdamage In Osteoporosis #7932
T.C. Lee, N. J. Mahony, D. Taylor; a Department of Anatomy, Royal College of Surgeons in Ireland, b Department of Anatomy & c Trinity Centre for Bioengineering, Trinity College, Dublin 2, Ireland

15:30 Panel Discussion
### 2 Musculoskeletal Mechanics-Joint ISB Track

**2.3.3 Motor Control of Human Movement (Ankle And Foot)**

**Session Organizers /Chairs:** W. I. Schoellhorn, Keith Davids

**Chair:**

**Tuesday August 1**

**Room R1.049**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
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<tr>
<td>16:00-16:15</td>
<td>Novel concept: link development in response to mechanical load - joint stability as a function #7181</td>
<td>György Seress a, Kálmán Kovács b, György Lellei c; Dept. of Traumatologic Surgery and Hand Surgery Division a and CT c Hospital, Vác; Boronkai Technical Secondary School, Vác b Hungary</td>
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<td>16:15-16:30</td>
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<td>16:30-16:45</td>
<td>Neuromuscular modulation and impact related to changes of level of muscular preactivation in a frontal car crash simulated collision #4773</td>
<td>Pascale Chavet a, b, Martine Pithieux a, Caroline Nicol a, et François Lachamp a; Laboratory of Aerodynamics and Biomechanics of Motion (LABM), USR 2164 CNRS-Université de la Méditerranée, Marseille, France; Laboratory Movement and Perception (M&amp;P), UMR 6152 CNRS-Université de la Méditerranée, Marseille, France; Physiological Determinants of Physical Activities (DPAP), UPRES EA 3285 Université de la Méditerranée, Marseille, France</td>
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<tr>
<td>16:45-16:00</td>
<td>Principle superposition during a static prehension of a circular object #6665</td>
<td>Jaebum Park a, Jae Kun Shim a, b, Dept. of Kinesiology, Univ. of Maryland College Park, MD, USA; Bioengineering Program/Neuroscience and Cognitive Science Program, Univ. of Maryland College Park, MD, USA</td>
</tr>
<tr>
<td>17:00-17:15</td>
<td>Coordination of concurrent single-joint movements #6221</td>
<td>Gerhard Staude, Dung Congkhac, and Werner Wolf; Universitéit der Bundeswehr München, Neubiberg, Germany</td>
</tr>
<tr>
<td>17:15-17:30</td>
<td>Muscle redundancy enables the transition between, and adjustments of, complex motor tasks # 5277</td>
<td>FA Medina a, b, RV McNamara a, SL Backus b, M Venkadesan a, VJ Santos a, and FJ Valero-Cuevas b, c, a Neuromuscular Biomechanical Laboratory, Cornell Univ., Ithaca, NY; The Hospital for Special Surgery, NY NY</td>
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**2 Musculoskeletal Mechanics-Joint ISB Track**

**2.7.4 Musculoskeletal Modelling (Elbow and Shoulder Biomechanics)**

**Tuesday August 1**

**Chairs:** Bart Koopman, Sinn Lawson

**Room R0.002**

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<tr>
<th>Time</th>
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<th>Authors</th>
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<tr>
<td>16:00-16:15</td>
<td>Validating a neuromusculoskeletal model of the elbow joint #6560</td>
<td>Emer Doheny, David FitzPatrick, Madeleine Lowery, Mark O’Malley; School of Electrical, Electronic and Mechanical Engineering, Univ. College Dublin, Ireland</td>
</tr>
<tr>
<td>16:15-16:30</td>
<td>A computer model to evaluate radial head translation #6627</td>
<td>Carole Martin a, laurel Kuhaus a, b, Karol Galik c, Angela M. Flamm c, Adrian L. Butler c, Mark E. Baratz a, and Mark Carl Miller a, b, a Ecole Normale Superieure de Cachan, France; Dept. of Bioengineering, Univ. of Pittsburgh, PA, USA; Orthopaedic Biomechanics Laboratory, Allegheny General Hospital, Pittsburgh, PA, USA; 4 Dept. of Mechanical Engineering, Univ. of Pittsburgh, PA USA</td>
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<tr>
<td>16:30-16:45</td>
<td>A finite element model of the gleno-humeral joint for the abduction #7102</td>
<td>Laure Devun a, Fabien Billuart a, b, Yoann Lafon a, David Mitton a, Olivier Gagey a, Wafa Skalli a, a Laboratoire de biomécanique, ENSAM CNRS UMR 8005, Paris, France; b Groupe Hospitalier Les Cheminots, Paris, France; IFMK medicale, Paris, France; CHU Bicêtre, Paris, France</td>
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<td>16:45-16:00</td>
<td>withdrawn</td>
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Development of an Arm Model with a Bionic Elbow Joint #7286
Yu Moriwaki\textsuperscript{a}, Nobuo Sakai\textsuperscript{b}, Yoshinori Sawa\textsuperscript{a}, Teruo Murakami\textsuperscript{a}; \textsuperscript{a} Graduate School of Engineering, Kyushu Univ., Fukuoka, Japan; \textsuperscript{b} Faculty of Engineering, Kyushu Univ., Fukuoka, Japan

Modeling of minimal-time weight lifting using the elbow joint muscles #4594
Michał Wychowanski\textsuperscript{a}, Andrzej Wita\textsuperscript{a}, Grzegorz Slugocki\textsuperscript{b}, Jan Gajewski\textsuperscript{a}, Grzegorz Orzechowski\textsuperscript{b}; \textsuperscript{a} The Józef Piłsudski Academy of Physical Education, Warsaw, Poland; \textsuperscript{b} Warsaw Univ. of Technology, Warsaw, Poland

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.1.2.4 Knee
Session Organizers: Thomas P. Andriacchi, Fabio Catani
Tuesday August 1
Room R 0.005

Role of tibial constraint on knee joint biomechanics under muscle loads #4223
W. Mesfar, A. Shirazi-Adl; Dept. of Mechanical Engineering, École Polytechnique, Montréal, Québec, Canada

Moment Potential Balance at the Knee Is Effected By Total Knee Arthroplasty #5225
Buford, WL, Jr; Stinson, ZS; Ivey, FM; Univ. of Texas Medical Branch, Galveston, TX, USA

Contact Locations of the Knee Joint In Deep Knee Flexion #7048
Mohamed Samir Hefzy\textsuperscript{a}, Kevin Lee Aeschliman\textsuperscript{b}, Michael J. Dennis\textsuperscript{b}; \textsuperscript{a}Biomechanics and Assistive Technology Laboratory, Dept. of Mechanical, Industrial and Manufacturing Eng., The Univ. of Toledo, Toledo, Ohio, USA; \textsuperscript{b} Dept. of Radiology, Medical Univ. of Ohio, Toledo, Ohio, USA

Ambulatory Inertial System for 3D Knee Joint Angles Measurement during Gait #7460
Julien Favre\textsuperscript{a}, Rachid Aissaoui\textsuperscript{a,b,c}, Brigitte Jolles\textsuperscript{b}, François Luthi\textsuperscript{b}, Jacques de Guise\textsuperscript{a,c}; \textsuperscript{a}Ecole Polytechnique Fédérale de Lausanne (EPFL), Laboratory of Movement Analysis and measurement (LMAM), Lausanne, Switzerland; \textsuperscript{b} Univ. Hospital of Lausanne (CHUV), Hôpital Orthopédique de la Suisse Romande (HOSR), Lausanne, Switzerland; \textsuperscript{c} Ecole de technologie Supérieure, Laboratoire de recherche en imagerie et orthopédie (LIO), Montréal, Canada

Influence of muscular fatigue on agonist and antagonist muscle groups moments during loaded squats #7441
Guillaume Rao\textsuperscript{a}, David Amarantini\textsuperscript{a}, Laurent Vigouroux\textsuperscript{a}, Eric Berton\textsuperscript{a,d}; \textsuperscript{a}Mouvement et Perception, Université de la Méditerranée, Marseille, France; \textsuperscript{b} LAPMA, Université Paul Sabatier, Toulouse, France
3. Musculoskeletal systems and Performance-Joint ISB/ESB Track

Track Coordinators: Mark Grabiner, Günther Rau, Georg Duda

3.1.5.2 Upper Extremity Injury
Session Organizer: /Chair Mark Grabiner
Tuesday August 1
Room R1.046

16:15-16:30 Contributions of the Rotator Cuff Muscles to Glenohumeral Joint Mechanics during the Belly-press Clinical Exam #5462
Takashi Yanagawa a, Michael R. Torry a, Kevin B. Shelburne a, Marcus G. Pandy b
a Steadman-Hawkins Research Foundation, Vail, Colorado, USA; b Dept. of Mechanical and Manufacturing Engineering, Univ. of Melbourne, Melbourne, Australia

16:30-16:45 Changes in the moment arm of forearm muscles in a disrupted distal radioulnar joint #4987
Tan Lei Lai a, Barry P. Pereira a, Sook Yee Chong a, Jeffrey K.S. Low a, Yuhaini Bt. MOHAMAD-EUSOPE a, Cho Jui TAY b, a Musculoskeletal Research Laboratories, Dept. of Orthopaedic Surgery and b Division of Bioengineering, National Univ. of Singapore, SINGAPORE.

16:45-16:00 Scapular kinematics in shoulder abduction/adduction, with and without carrying loads #4962
Yuhaini bt. MOHAMAD-EUSOPE a, Sook Yee CHONG a, Barry P. PEREIRA a, Jeffrey K.S. LOW a, Tan Lei LAI a, a Musculoskeletal Research Laboratories, Dept. of Orthopaedic Surgery and b Department of Mechanical Engineering, National Univ. of Singapore, SINGAPORE.

17:00-17:15 The compensatory kinematics of the upper limb in various activities-of-daily-living within forearm with restricted forearm rotation #4998
Jeffrey K.S. LOW a, Sook Yee CHONG a, Yuhaini Bt. MOHAMAD-EUSOPE a, Tan Lei LAI a, Barry P. PEREIRA a, K. Casey CHAN a, b Mouroskeletal Research Laboratories, Dept. of Orthopaedic Surgery and b Division of Bioengineering, National Univ. of Singapore, SINGAPORE.

4. Implants for Trauma and Orthopedics-Joint ESB Track

4.3.2 Knee Endoprosthetics - In Vivo Assessment of Performance
Chairs: Alberto Leardini, Edward Valstar
Tuesday, Aug. 1
Room E1.03

16:00-16:15 Net moments of TKA during level walking based on video-fluoroscopy coupled with force plate data #5042
Monika Zihlmann, Renate List, Hans Gerber, Edgar Stüssi; Laboratory for Biomechanics, D-MAVT, ETH Zurich, Zurich, Switzerland

16:15-16:30 Motion analysis of kneeling in cruciate-retaining and posterior-substituting total knee arthroplasty #5717
Hidehiko Higaki a, Takeshi Shimotom a, Masa-aki Yoshizumi a, Yoshitaka Nakanishi b, Kosaku Kurata a, Satoshi Hamai a, Hiromasa Miura a and Yukihide Iwamoto a
a Faculty of Engineering, Kyushu Sangyo Univ., Fukuoka, Japan; b Faculty of Medicine, Kyushu Univ., Fukuoka, Japan

16:30-16:45 Sagittal curvature of total knee replacements predicts in vivo kinematics #4618
Lutz Dürselen a, Oliver Kessler b, Scott Banks c, Henrich Mann e, Frédéric Marin d, Institute for Orthopaedic Research and Biomechanics, Ulm, Germany; d Scientific Affairs, Stryker Europe, Thalwil, Switzerland; c Dept. of Mechanical & Aerospace Engineering, Univ. of Florida Gainesville, Florida, USA; e Biomécanique et génie Biomedical, Université de technologie de Compiègne, France

16:45-16:00 Polyethylene mobility and deformation in a mobile bearing prosthesis design: a Roentgen stereophotogrammetric analysis at 4 years #5580
Marcacci M., Russo A., Montagna L., Bragonzoni L., Mazzotti N., Zaffagnini S., Iacono F., Biomechanics Lab, Rizzoli Institute, Bologna, Italy

17:00-17:15 Accuracy and precision of a Model-Based RSA Technique for Measuring Implant Migration #4750
5. Occupational and Impact Injury Biomechanics

5.4.2 Head/Brain Injury
Session Organizers: Susan Margulies, Karol Miller, David Meaney
Tuesday August 1
Room R0.058

16:00-16:30 Predicting Unconsciousness From a Pediatric Brain Injury Threshold #7136
Qiliang Zhu, Michael Prange, Susan Margulies; Dept. of Bioengineering, Univ. of Pennsylvania, Philadelphia, PA USA

16:30-17:00 Analysis of head injuries by use of real-world impacts and computer models #7713
Melanie Franklyn, Liying Zhang, King Yang, Brian Fildes and Laurie Sparke
Monash Univ. Accident Research Centre (MUARC), Victoria, Australia; Bioengineering Center, Wayne State Univ., Detroit, Michigan, USA; General Motors Holden’s Automotive Limited, Victoria, Australia

17:00-17:15 Biomechanical reconstruction of traumatic brain injuries: Correlation between injury patterns and FE models #7461
Svein Kleiven; CTV - Centre for Technology in Health; Royal Institute of Technology, Huddinge, Sweden

17:15-17:30 Biomechanical simulation of the traumatic brain injury during the head impact #7369
Zdzislaw Król, Michał Chlebiej, Paweł Mikołajczak, Hans-Florian Zeilhofer
a HFZ-Center of multidisciplinary research in cranio-maxillo-facial surgery, Univ. of Basel, Basel, Switzerland; b Laboratory of Information Technology, Faculty of Mathematics, Physics and Informatics, Maria Curie-Sklodowska Univ., Lublin, Poland

5. Occupational and Impact Injury Biomechanics

5.13 Spine Kinematics
Session Organizers /Chairs: Giuseppe Andreoni, H.P. Wölfel
Tuesday August 1
Room R1.005

16:00-16:15 The effect of small changes of seat-back inclination on spine kinematics #4039
Steffen Adler, Nadine Piehler, Jan Hünniger, Reinhard Blickhan; Chair of Motion Science, Institute of Sports Science, Friedrich-Schiller-Univ., Jena, Germany

16:15-16:30 Differences in lumbar spine motion pattern of weight-lifters and normal subjects performing freestyle lifting trials #4334
Falk Mörl, Ingo Brand, Reinhard Blickhan; Forschungsgesellschaft für angewandte Systemssicherheit und Arbeitsmedizin mbH, Erfurt, Germany; Berufsgenossenschaft Nahrungmittel und Gaststätten, Prävention, Präventive Biomechanik, Erfurt, Germany; Friedrich-Schiller-Univ. Jena, Clinic for accident surgery, motor research group, Jena,
Germany; d Friedrich-Schiller-Univ. Jena, Institute of sport science, motion science, Jena, Germany

16:30-16:45 A method of evaluating the kinematics of a spine deformed by scoliosis using a motion capture system #5427
Paweł Maciejasz, Wiesław Chwała, Institute of Precision and Biomedical Engineering, Warsaw Univ. of Technology, Warsaw, Poland, Dept. of Anthropomotorsics, Academy of Physical Education, Cracow, Poland

16:45-17:00 Assessment of soft tissue artifacts for flexion-extension movements of the lumbar spine #7332
Giuseppe Luca Ciavarro, Giorgio Cesare Santambrogio, Giuseppe Andreoni Dipartimento di Bioingegneria, Politecnico di Milano, Milano, Italy

17:00-17:15 Understanding The Lumbar Spine Dynamic Stabilization #5053
Chiara Maria Bellini, Fabio Galbusera, Manuela Teresa Raimondi, Marco Brayda-Bruno, Laboratory of Biological Structure Mechanics, Politecnico di Milano, Milan, Italy

17:15-17:30 Experimental measurements of the lumbar spine kinematics and stiffness #4481
Lenka Jirková, Zdeněk Horák, Radek Sedláček, Petr Tichý, Jiří Michalec Laboratory of Biomechanics, Dept. of Mechanics, CTU in Prague, Prague, Czech Republic

6. Sport Biomechanics-Joint ISB Track
6.2 Computer-Simulation in Sport
Session Organizer: Jason Cheung
Tuesday August 1
Room D2.12

16:00-16:15 Three-dimensional Finite Element Analysis of the Human Foot and Ankle during the Stance Phases of Gait # 7881
Jason T.M. Cheung, Ming Zhang, Benno M. Nigg, Human Performance Laboratory, Faculty of Kinesiology, Univ. of Calgary, Canada; Dept. of Health Technology and Informatics, The Hong Kong Polytechnic Univ., Hong Kong

16:15-16:30 Development of a Nonlinear Viscoelastic Model of Human Body for Computation of Impact Force during Running #5365
A. A. Zadpoor, A. A. Nikooyan, A. R. Arshi; Biorobotics and Virtual Reality Research Laboratory, Dept. of Biomedical Engineering, Amirkabir Univ. of Technology, Tehran, Iran

16:30-16:45 Detailed investigation of mechanisms causing golf-specific injuries using analytical methods and computer simulation #5586
Stefan Lehner, Oskar Wallrapp, Klemens Burghart, BASiS-Applied Biomechanics GmbH, Munich, Germany; Dept. of Precision- and Micro-Engineering, Univ. of Applied Science, Munich, Germany; Dept. of Sport Equipment and Materials, Technical Univ., Munich, Germany

16:45-16:00 Simulation and optimization of an uneven parallel bar release-regrasp maneuver #6636
Alison L. Sheets, Mont Hubbard; Sports Biomechanics Lab, Univ. of California, Davis, USA

17:00-17:15 Implementation of a Numerical Human Body Model for Long Track Speed Skating Impacts #6833
Patrick A. Forbes, Lex van Rooij, Frank Swartjes, Herman Mooi; TNO Science and Industry, Automotive Safety, Delft, The Netherlands

17:15-17:30 Real time modelling of human body unsupported motion #7368
Iliia Pshenichniy, Andrey Morozov, Victor Sholukha, Dept. of Applied Mathematics, State Polytechnic Univ. of Saint Petersburg, Russia; Dept. of Anatomy, Université Libre de Bruxelles, Brussels, Belgium

13. Respiratory Mechanics
13.3 Mechanics of the Lung Parenchyma
Session Organizers: Bela Suki, Daniel Navajas
Tuesday August 1
Room R2.088

16:00-16:15 Lung tissue mechanics: from extracellular matrix to alveolar network behavior #5967
Bela Suki, Harikrishnan Parameswaran, Arnab Majumdar; Dept. of Biomedical Engineering, Boston Univ., Boston, MA, USA

16:15-16:30 Lung Tissue Mechanics and Parenchyma Remodelling in Respiratory Diseases
Patricia R. M. Rocco, MD, PhD; Associate Professor of Physiology, Chief of Laboratory of Pulmonary Investigation, Carlos Chagas Filho Biophysics Institute, Federal University of Rio de Janeiro, Rio de Janeiro, Brazil

16:30-16:45 Micromechanics of Injured Lungs #4371
Rolf D Hubmayr; Mayo Clinic College of Medicine, Dept. of Physiology and Biomedical Engineering. Rochester, MN, USA

16:45-16:00 Cell biomechanics of the alveolar epithelium #5190
Daniel Navajas; Unitat de Biofisica i Bioenginyeria. Facultat Medicina, Universitat Barcelona, Spain

17:00-17:15 A four dimensional alveolar model of the lung #4390
Hiroko KITAOKA; Graduate School of Medicine, Osaka Univ., Suita City, JAPAN

17:15-17:30 Micromechanics of the lung: from the parenchyma to the cytoskeleton #5431
Dimitrije Stamenović; Dept. of Biomedical Engineering, Boston Univ., Boston, MA, USA

14.3.4 Computational Hemodynamics
Session Organizer : Niko Stergiopulos
Tuesday, Aug. 1
Room G0.01

16:00-16:15 On the relative importance of rheology for image-based CFD models of the carotid bifurcation # 4929
Sing-Wook Lee, David A. Steinman; Imaging Research Laboratories, Robarts Research Institute, London, Canada; Dept. of Mechanical and Industrial Engineering, Univ. of Toronto, Toronto, Canada

16:15-16:30 Fluid-structure interaction computational modelling of realistically reconstructed atherosclerotic plaques to assess their vulnerability to rupture based on collagen fibre architecture # 6721
Ramses Galaz, Rosaire Mongrain, Valerie Pazos, Richard Leask, Jean Claude Tardif; McGill Univ., Montreal, Canada; Montreal Heart Institute, Montreal, Canada

16:30-16:45 Comparison of Measured and Virtual Doppler Ultrasound Spectra in Mouse Aorta #5266
C. Ross Ethier, Yu-Qing Zhou, Amy Lin, Akiva Feintuch, David A. Steinman, Mark Henkelman; Mechanical and Industrial Engineering and B Institute of Biomaterials and Biomedical Engineering; Univ. of Toronto, Toronto, Canada; c Mouse Imaging Centre, Hospital for Sick Children, Toronto, Canada

16:45-16:00 Computational fluid dynamics in the development of novel vascular grafts #5876
Timothy M. McGloughlin, Micheal T. Walsh and Thomas P. O'Brien; Centre for Applied Biomedical Engineering Research and Materials and Surface Science Institute, Dept. of Mechanical and Aeronautical Engineering, Univ. of Limerick, Limerick, Ireland.

17:00-17:15 Computational framework for the study of cerebral aneurysms and their endovascular treatment #6400
Alejandro Frangi, Christopher M. Putman, Juan R. Cebra; Dept. of Technology, Pompeu Fabra Univ., Barcelona, Spain; School of Computational Sciences, George Mason Univ., Virginia, USA

17:15-17:30 Influence of Microcalcifications on Vulnerable Plaque Mechanics - FSI Modeling #7121
Idit Avrahami, Kris Dumont, Mory Gharib, John Ricotta, Danny Bluestein; Dept. of Biomedical Engineering, Stony Brook Univ., Stony Brook, NY, USA; California Institute of Technology, CA, USA; Dept. of Surgery, Stony Brook Univ. Hospital, Stony Brook, NY, USA

14. Cardiovascular Mechanics
14.10.3 Large Vessel Fluid Mechanics-Implants and Devices
Session Organizers ad Chairs: Hans-Henning Eckstein, Hermann Berger
Tuesday August 1
Room G1.27

16:00-16:15  Experimental validation of a wave propagation model of blood flow in vessels with viscoelastic wall properties # 5089
D. Bessems, M.C.M. Rutten, F.N. van de Vosse; Dept. of Biomedical Engineering
eindhoven Univ. of Technology, The Netherlands

16:15-16:30  Numerical Simulation Of The Asymmetric Redirection Of Blood Flow In The Left Ventricle #6256
T. Schenkel, H. Oertel; Institute for Fluid Mechanics, Univ. Karlsruhe, Germany

16:30-16:45  Shear-thinning viscosity effects in bifurcating blood vessels #4377
Abdel Monim Artoli a, Adéla Sequeira a, João P. Janela a, b; aCEMAT, Departamento de Matemática, Instituto Superior Técnico, Lisboa, Portugal; bISEG, R. Quelhas, Lisboa, Portugal

16:45-16:00  Numerical simulation of the blood flow in the curved blood vessel with and without stent #7100
Yuhua Peng a, Meime Li a, Dieter Liepsch b; a School of Life Science and Technology, Beijing Institute of Technology, Beijing, China; b Fachhochschule Munich, Munich, Germany

17:00-17:15  Analysis of pulsatile blood flow in stented human coronary arteries #5312
Vahab Dehlaghi, Mohammad Tafazzoli-Shadpour
Dept. of Biomedical Engineering, Amirkabir Univ. of Technology (Tehran Polytechnic), Tehran, Iran

17:15-17:30  A Laser Guiding and Tweezers Platform for Cardiovascular Endothelia Assembly #4462
H. Hocheng and C. Tseng; Dept. of Power Mechanical Engineering, National Tsing Hua Univ., Hsinchu, Taiwan, ROC
14. Cardiovascular Mechanics
Session Organizers /Chairs: Gerhard Holzapfel, Takeo Matsumoto
Tuesday August 1
Room R1.004
16:00-16:15 Modelling of Non-Linear Arterial Deformation and Friction Work during PTCA #5235
Denis Larochê, Sebastien Delorme, Todd Anderson and Robert DiRaddo
Industrial Materials Institute (IMI), Boucherville, QC, Canada
16:15-16:30 An analysis of stresses in peripheral arteries following stenting using the finite element method #5899
Michael Early, Daniel J Kelly; Trinity Centre for Bioengineering, Dept. of Mechanical Engineering, Trinity College, Dublin, Ireland
16:30-16:45 Pressure Induced Restenosis of Femoral Artery Bypass Grafts #5706
Triona Campbell, Reena Cole and Mark Davies; Stokes Research Institute, Univ. of Limerick, Ireland
16:45-17:00 Rapid formation model of tissue engineered artificial vascular graft #7418
Katsuko Furukawa, Nobuaki Matsuura, Ryo Noaki, Tetsuya Tateishi, Takashi Ushida
Biomedical Engineering Laboratory, Graduate School of Engineering; Center for Disease Biology and Integrative Medicine, School of Medicine, Univ. of Tokyo, Tokyo, Japan
17:00-17:15 Mechanical analysis of human carotid arteries affected by PseudoXanthoma Elasticum # 6303
Edouard Diouf, Ingrid Masson, Pierre Boutouyrie, Béatrice Labat, Mustapha Zidi
Université Paris 12 Val de Marne, Faculté de Médecine, UMR INSERM 651, Créteil, France
Hôpital Européen Georges Pompidou, Service de Pharmacologie, Paris, France
17:15-17:30 Mechanical effect of friction and stretching on endothelium denudation # 4899
Rouwayda El-Ayoubi, Sébastien Delorme, Robert DiRaddo; Industrial Materials Institute, Boucherville, QC, Canada

15. Microcirculation
15.5 Lymphatic Biomechanics and Tissue Stresses
Session Organizer: Melody Swartz
Tuesday August 1
Room R1.006
16:00-16:15 Interstitial Flow and Autologous Chemotaxis #5701
Melody A. Swartz, Mark E. Fleury, Jacqueline D. Shields; Institute of Bioengineering, École Polytechnique Fédérale de Lausanne, Switzerland
16:15-16:30 Estimating wall shear stress in contracting mesenteric microlymphatics #6330
J. Brandon Dixon, Gerard Cote, Anatoly Gashev, James Moore, David Zaweija
Biomed. Eng., TAMU, College Station, TX, USA; Med. Phys., TAMUS Health Science Center, College Station, TX, USA
16:45-17:00 Pressure regulation in the cochlear perilymphatic low pressure system under the influence of stationary and dynamic volume processes #5569
Ernst Juergen Haberland, Hans Juergen Neumann; Dept. of ENT and HNS, Univ. of Halle, Germany; Dept. of ENT and HNS, City Hospital Martha-Maria, Halle, Germany
17:00-17:15 Compression and hypoxia in an engineered skeletal muscle model #4604
Debby Gawlitta, Cees W.J. Oomens, Frank P.T. Baaijens, Carlijn V.C. Bouten
Technical Univ. Eindhoven, Dept. of Biomedical Engineering, Eindhoven, The Netherlands
17:15-17:30 Microstructural analysis of deformation-induced hypoxic damage in skeletal muscle #4781
Karlien K. Ceelen, Cees W.J. Oomens, Frank P.T. Baaijens; Eindhoven Univ. of Technology, Dept. of Biomedical Engineering, The Netherlands

16. Reproductive Biomechanics
16.8 Pelvic Floor Mechanics
Session Organizers /Chairs: Margot Damaser, James Ashton-Miller
Tuesday August 1
Room R000.6

16:00-16:30  Keynote: On the Functional Anatomy and Biomechanics of the Female Pelvic Floor
#7249
James A. Ashton-Miller; Biomechanics Research Laboratory, Univ. of Michigan, Ann Arbor, USA

16:30-16:45  Pelvic floor EMG and pressure differences during coughing between women with and without stress urinary incontinence #5125
Linda McLean; Motor Performance Laboratory, Queen’s Univ., Kingston, Canada

16:45-16:00  Dynamics of Pelvic Floor Function # 5141
Christos E Constantinou a, Qiyu Peng a, Ruth Jones a, Inder Perkash a, Yoshinobu Murayama b, Sadao Onata b, cStanford Univ., Stanford, USA; b Nihon Univ., Fukushima, JAPAN

17:00-17:15  Finite element studies of the deformation of the pelvic floor #6079
J.A.C. Martins a, M.P.M. Pato b, E.B. Pires b, R.M.N. Jorge c, M. Parente c, T. Mascarenhas d aI.S.T. and bI.S.E.L., Lisbon, Portugal; c F.E.U.P. and dF.M.U.P., Oporto, Portugal

17:15-17:30  Computational Model of Levator Ani Muscle Stretch During Vaginal Delivery #4644
Lennox Hoyte a, Petr Krysl b, Giridhar Chukkapalli b, Amitava Majumdar b, Dong Ju Choib, Abhishek Trivedi b, Simon K. Warfield c, and Margot S. Damaser c a Harvard Medical School, Boston, Mass, USA; c Cleveland Clinic Foundation, Cleveland, Ohio, USA.

17. Biomechanics in Nature
17.4.3 Swimming and Flying
Session Organizers: Johann von Leeuwen, Charlie Ellington
Chair: Johann von Leeuwen, Malcolm Gordon
(Incorporating presentations from Thread 2: Flow-Structure Interaction; Thread Organizers: Chris Bertram, Ross Ethier, Charlie Ellington)
Tuesday August 1
Room R1.087

16:00-16:15  Variations in wing kinematics and wake signatures in bird flight experiments #6070
G.R. Speedding a, M. Rosén a, A. Hedenström a, bAerospace and Mechanical Engineering, Univ. of Southern California, Los Angeles, USA; aDept. of Theoretical Ecology, Lund Univ., Lund, Sweden

16:15-16:30  The significance of wing-wake interactions for force control in flapping wings #6698
Fritz-Olaf Lehmann; Dept. of Neurobiology, The Univ. of Ulm, Germany

16:30-16:45  On the symmetry and periodicity of vortex wakes in animal swimming and flight
David Lentink, Florian T. Muijres, Johan L. van Leeuwen; Experimental Zoology group, Wageningen Univ., Wageningen, The Netherlands

16:45-16:00  Withdrawn

17:00-17:15  Size effect in insect flight: leading-edge vortex, trailing-edge vortex and tip vortex #4558
H. Liu a, H. Aono a, Y. Inada a, and W. Shyy b, cChiba Univ./JST, JAPAN; b Univ. of Michigan, USA

17:15-17:30  Efficiency of Flapping Flight #5066
Z. Jane Wang; Theoretical and Applied Mechanics, Cornell Univ., New York, USA

18. Trends in Cranial and Spinal Biomechanics
8.2.2 Imaging and management of CSF dynamics
(Incorporating presentations from Thread 2: Flow-Structure Interaction; Thread Organizers: Chris Bertram, Ross Ethier, Charlie Ellington)
Session Chairs: C. Bertram, H.-J. Steiger
Tuesday, Aug. 1
Room R. 2.007

16:00-16:30  Respiration and CSF transport #4988
Zbyšek Štěpáník a, Agnieszka Kaczmarsk a, Jakub Otáhal a, c, Michal Otáhal b, Stanislav Otáhal a
16:30-16:45 Influence of degenerative changes of cervical spine on cerebrospinal fluid dynamics
#4989
Agnieszka Kaczmarska, Zbysek Stepanik, Petr Vanek, Stanislav Otahal, Jakub Otahal
a Dept. of Anatomy and Biomechanics, FPES, Charles Univ., Prague, Czech Republic;
b Dept. of Anesthesiology and Resuscitation, Faculty Hospital KV, Prague, Czech Republic;
c Institute of Physiology, Czech Academy of Sciences, Prague, Czech Republic.

16:45-16:00 A modelling study on the hydrodynamic causes of non-communicating syringomyelia
# 5942
Serge Cirovic; The Centre for Biomedical Engineering, Univ. of Surrey, Guildford, UK

17:00-17:15 Visualization of basic flow pattern in a subarachnoid hemorrhage model and measurement of influence due to variant kinetic applications #7787
Hanggi D., Stock M., Galdeano J., Affeldt K., Steiger H.-J., Liepsch D.
a Dept. of Neurosurgery, Heinrich-Heine-Univ., Düsseldorf, Germany;
b Dept. of Supply Engineering 05, Laboratory of Biofluid Mechanics, Munich Univ. of Applied Sciences;
c Laboratory of Biofluid Mechanics, Dept. of Cardiovascular Surgery, Charité – Universitätsmedizin Berlin, Germany

19. Biotransport
19.3 Transport across blood vessel walls II
Session Organizer /Chair: Peter Weinberg
Tuesday August 1
Room R0.003

16:00-16:15 Effect of Flow Disturbance on ATP/ADP Concentration at the Endothelial Surface #6794
Hyo Won Choi, Abdul I. Barakat; Dept. of Mechanical and Aeronautical Engineering, Univ. of California, Davis, USA

16:15-16:30 Shear-induced changes in microvascular hydraulic conductivity #4074
Norman R. Harris, Min-ho Kim, and John M. Tarbell; a Louisiana State Univ. Health Science Center, Shreveport, Louisiana USA; b City College of New York/CUNY, New York, New York USA

16:30-16:45 Computer simulation of coupled luminal and transmural mass transport processes in a carotid bifurcation model #4567
Martin Prosi, Karl Perktold, a MOX, Dept. of Mathematics, Politecnico di Milano, Milan, Italy; b Institute of Mathematics D, Graz Univ. of Technology, Graz, Austria

16:45-16:00 Effects of a shear flow and water filtration on transport of LDL from flowing fluid to and proliferation of the cells of a model of an arterial wall #4548
Takeshi Karino, Xiaoming He, Jiro Sakai; Research Institute for Electronic Science, Hokkaido Univ., Sapporo, Japan

17:00-17:15 In Vitro Study of LDL Transport Under Convective Conditions #4357
Limary M. Cancel, Andrew Fitting, John M. Tarbell; a City College of New York, Dept. of Biomedical Engineering, New York, NY, USA; b Pennsylvania State Univ., Dept. of Chemical Engineering, PA, USA

17:15-17:30 Transmural water and macromolecular transport in atherosclerosis prone and resistant vessels #7785
Yixin Shou, Zhongqing Zeng, Kung-ming Jan, and David S. Rumschitzki
a Dept. of Chemical Engineering, City College of GSUC of CUNY, New York, NY, USA; b Dept. of Medicine, Columbia Univ. College of Physicians & Surgeons, New York, NY, USA

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.14.1 Image-based anatomical modelling for CAD/FEA applications
Session Organizer /Chair: Panos Diamantopoulos
Tuesday August 1
Room R1.002
16:00-16:15 FEA modelling of anatomical structures #7672
A. Anwar, A. Mekonnen, P. Diamantopoulos; Biomedical Modelling Unit, Univ. of Sussex, Brighton, UK

16:15-16:30 Customised FEA/CFD modeling # 7673
M. De Vleeschouwer, J. Dille, P. Diamantopoulos; Materialise N.V., Leuven, Belgium; Biomedical Modelling Unit, Univ. of Sussex, Brighton, UK

16:30-16:45 A contour-based segmentation algorithm to produce outer surface models for computer applications in bone reconstruction #4035
Frederik Gelaude, Jos Vander Sloten, Bert Lauwers; Division of Biomechanics and Engineering Design, Katholieke Universiteit Leuven, Heverlee, Belgium; Division Production, Machine Design and Automation, Katholieke Universiteit Leuven, Heverlee, Belgium

16:45-17:00 On the use of Mimics FEA to characterize and generate finite element meshes of bone scaffolds #7350
Damien Lacroix, Clara Sandino, Montse Charles-Harris, Josep A. Planell; Reference Centre for Bioengineering of Catalonia (CREBEC), Universitat Politècnica de Catalunya, Barcelona, Spain

17:00-17:15 Development of CT /MRI-based 3D models for implant simulation and optimization #6087
Peter Schuller-Götzburg, Michael Eichriedler, Karl Entacher, Alexander Petutschnigg, Rosemarie Forstner, Herbert Resch; Paracelsus Private Medical Univ., Salzburg, Austria; Salzburg Univ. of Applied Sciences, Salzburg, Austria

17:15-17:30 Functional Imaging of Lower Airways through Computational Fluid Dynamics #5442
J. De Backer, W. Vos, A. Devolder, B. Partoens, P. Parizel, W. De Backer; Univ. of Antwerp, Dept. of Radiology, Belgium; Univ. Hospital of Antwerp, Dept. of Pulmonology, Belgium

Thread 2: Flow-Structure Interactions
T2.1.2 Cardiovascular Mechanics-FSI Problems in arterial disease
Chairmen: Jay Humphrey, Danny Bluestein
Tuesday August 1
Room R2.091

16:00-16:15 Biomechanics of Cerebral Vasospasm #4289
J. D. Humphrey, L. E. Niklason; Dept. of Biomedical Engineering, Texas A&M Univ., College Station, TX - USA; Dept. of Anesthesiology, Yale Univ., New Haven, CT - USA

16:15-16:30 Quantifying vessel material properties using MRI under pressurized condition and MRI-based FSI models for blood flow in diseased human arteries #4095
Xueying Huang, Chun Yang, Jie Zheng, Pamela K. Woodard, and Dalin Tang; Mathematical Sciences Dept., Worcester Polytechnic Institute, Worcester, MA, USA; Mathematics Dept., Beijing Normal Univ., Beijing, China; Mallinkrodt Institute of Radiology, Washington Univ., St. Louis, MO, USA

16:30-16:45 Fluid-Wall Coupled Simulation Of Pulsatile Blood Flow In Compliant Stenosed Arteries #5897
Mingxiu Li, Jason Beech-Brandt, Lester R John, Peter R Hoskins, William J Easson; Univ. of Edinburgh, Edinburgh, UK; Univ. of Cape Town, South Africa

16:45-17:00 Fluid-structure interaction in abdominal aortic aneurysms with real geometry #5966
Uwe Janoske, Gerhard Silber, Ralf Kröger, Michael Stanull, Günter Benderoth, Thomas Schmitz-Rixen; Center of Biomedical Engineering (CBME), Frankfurt/M., Univ. of Cooperative Education, Mönch, Germany; Fachhochschule Frankfurt, Institut für Materialwissenschaften, Frankfurt/M., Germany; FLUENT Deutschland GmbH, Darmstadt, Germany; Gefäß- und Endovascularchirurgie, Klinikum der Johann Wolfgang Goethe-Universität Frankfurt, Frankfurt/M., Germany
17:00-17:15 Influence of Thrombus in an Abdominal Aortic Aneurysm Using a FEM-FSI Model #7113
Kris Dumont, John Ricotta, Paul Impellizzeri, Danny Bluestein, Biomedical Engineering, Stony Brook Univ., Stony Brook, NY, USA; Surgery, Stony Brook Univ. Hospital, Stony Brook, NY, USA

16:15-16:30 Numerical simulation of blood flows through a stent #5723
Jean-Frédéric Gerbeau, Miguel A. Fernandez, Vincent Martin; INRIA, Rocquencourt, Le Chesnay; France

Thread 3: Biomechanics at Micro- and Nanoscale Levels
Thread organizer: Hiroshi Wada
T3.1 Cell Mechanics
Session Organizers: Kazuo Tanishita, Hiroshi Wada
Tuesday August 1
Room G0.43
16:00-16:15 A System of In Situ Osteocyte Organ Culture Models for Mechanobiological Study of Bone #7231
Adam M. Sorkin and Melissa L. Knothe Tate, Depts. of Biomedical and Mechanical & Aerospace Engineering, Case Western Reserve Univ., Cleveland, OH, USA

16:15-16:30 Microstructure of cortical bone around the foramen in bovine lumbar vertebra # 6650
Bijay Giri, Shigeru Tadano, Masahiro Todoh, Kazuhiro Fujisaki; Division of Human Mechanical Systems and Design, Graduate School of Engineering, Hokkaido Univ., Sapporo, Japan

16:30-16:45 Multiscale analysis of different driving effects governing fluid movement in cortical bones: a coupled viewpoint for the mechanotransduction #5543
Thibault Lemaire, Salah Naïli, Agnès Rémond; Laboratoire de Biomécanique et Biométhériaux Ostéo-Articulaires, Université Paris Val de Marne, Créteil, France

16:45-17:00 Full-field characterisation of mechanical strain in the Flexercell and stimulation optimization study #7162
Mark Thompson, Claus-Eric Ott, Susan Ahrens, Uwe Kornak, Stefan Mundlos, Georg Duda; Center for Musculoskeletal Surgery, Charité - Universitätsmedizin Berlin, Germany; Institute for Medical Genetics, Charité - Universitätsmedizin Berlin, Germany; Max-Planck-Institute for Molecular Genetics, Berlin.

17:00-17:15 Characterizing mechanical behavior of cells and soft tissues by indentation: Potential and limitations #6167
Narendra K. Simha, Ravi Namani, Sidharth Chiravarambath, Jack L. Lewis, Perry H. Leo, Biomechanics Lab. Dept. of Orthopaedic Surgery, Univ. of Minnesota, Minneapolis, MN, USA; Dept. of Mechanical Engineering, Univ. of Miami, Coral Gables, FL, USA; Dept. of Aerospace Engineering and Mechanics, Univ. of Minnesota, Minneapolis, MN, USA

17:15-17:30 Characterization of cellulosic microfibrils for permeability studies through microfibril dispersed biopolymer films #4215
Ayan Chakraborty, Dr. Mohini Sain; Univ. of Toronto, Toronto, Canada

Company Presentation
17:00-17:45
Tuesday, August 1
R0.0056
Image-based meshing: from scan to mesh in minutes
Philippe Young, Ingrid Weber; Simpleware Ltd, Innovation Centre, Rennes Drive, Exeter, UK

ESB Gala Dinner
18.00
Augustiner Beer Garden
Scientific Program

Wednesday, Aug. 2, 2006

08:15-09:45

1. Bone Mechanics – Joint ESB Track
1.4.1 Bone Remodelling 1
Session Organizer /Chair: Harri Weinans
Wednesday, August 2
Room R0.055

08:15-08:30 Osteocytes As Mechanosensors In The Inhibition Of Bone Resorption Due To Mechanical Loading # 4221
L. You, S. Temiyasathit, C. Jacobs; Cell and Molecular Biomechanics Laboratory, Biomechanical Engineering Division, Dept. of Mechanical Engineering, Stanford Univ., California, USA; Bone and Joint Rehabilitation R&D Center, Dept. of Veteran’s Affairs, Palo Alto, California, USA.

08:30-08:45 Study of cortical instability due to geometric expansions of the femoral neck #4269
#Taeyong Lee, #Benjamin W. Schafer, #Thomas J. Beck
#Bone Biomechanics Lab, National Univ. of Singapore, Singapore; #Dept. of Civil Engineering, #Dept. of Radiology, Johns Hopkins Univ., Baltimore, USA

08:45-09:00 Effects of cyclic loading on the residual strength of cortical bone: Implications for fatigue fracture #5278
Ei Yamamoto, Atsushi Mita; School of Biology-Oriented Science and Technology, Kinki Univ., Wakayama, Japan

09:00-09:15 Exploring the location of periosteal osteoblast activity induced by mechanical loading #6161
Ted S. Gross, Sandy L. Poliachik, and Sundar Srinivasan;
Univ. of Washington, Seattle, Washington, USA

09:15-09:30 Exercise Improves the Strength of Bone in the Proximal Tibia of Hindlimb Unloaded Mature Rats # 6194
J. D. Alcorn, B. A. Vyvial, S. A. Bloomfield, H. A. Hogan; "Dept. of Mechanical Engineering, Texas A&M Univ., USA; "Dept. of Health and Kinesiology, Texas A&M Univ., College Station, Texas, USA; E. Perilli, F. Baruffaldi, F. Traina, R. Fognani, M. Visentin, S. Stea, M. Baleani, M. Viceconti; "Laboratorio di Tecnologia Medica, Istituti Ortopedici Rizzoli, Bologna, Italy; "I Divisione, Chirurgia Ortopedico-Traumatologica, Istituti Ortopedici Rizzoli, Bologna, Italy

09:30-09:45 Quantification of age-related changes in mechanical properties and histomorphometric parameters of cancellous bone in femoral head in osteoarthritis #6962
E. Perilli, F. Baruffaldi, F. Traina, R. Fognani, M. Visentin, S. Stea, M. Baleani, M. Viceconti; "Laboratorio di Tecnologia Medica, Istituti Ortopedici Rizzoli, Bologna, Italy; "I Divisione, Chirurgia Ortopedico-Traumatologica, Istituti Ortopedici Rizzoli, Bologna, Italy

09:45-10:00 Simultaneous proximal-distal tunneling in osteon development #5017

2 Musculoskeletal Mechanics-Joint ISB Track
2.3.4 Motor Control of Human Movement
Session Organizers /Chairs: W. I. Schoellhorn, Keith Davids
Wednesday, August 2
Room R1.049

08:15-08:30 Spinal Proprioception and Back Muscle Activation are Impaired by Spinal “Creep” but Not By Fatigue # 7427
Daniel Sanchez, Michael Adams, Patricia Dolan; "Dept. of Anatomy, Univ. of Bristol, Bristol, UK; "Faculty of Medicine, Univ. of Valencia, Valencia, Spain

08:30-08:45 Postural mechanisms during unipedal quiet stance on compliant surfaces # 7575
James L. Croft, Vinzenz von Tscharner, Ron F. Zernicke
08:45-09:00 Withdrawn

09:00-09:15 A Modal Analysis of Movement Control Strategies in a Maximal Standing Reach #7477
Alaa A. Ahmed, James A. Ashton-Miller
Biomechanics Research Laboratory, Univ. of Michigan, Ann Arbor, USA

09:15-09:30 Voluntary step initiation in response to a visual stimulus: effects of movement direction and age #7009

09:30-09:45 Age Alters the Magnitude and Timing of Cortical Control of Antagonist Muscle in Humans #5734
Tibor Hortobágyi a, M. Fernandez del Olmo b, John C. Rothwell b; Biomechanics Laboratory, East Carolina Univ., Greenville, NC, USA; bSobell Dept. of Motor Neuroscience and Movement Disorders, Institute of Neurology, London, UK

2 Musculoskeletal Mechanics-Joint ISB Track
2.7.5 Musculoskeletal Modelling (Muscle modeling)

Wednesday, August 2
Chair: Sian Lawson
Room R0.002

08:15-08:30 A 3D approach to model skeletal muscle tissue in impact processes #5906
Benjamin Winkel; Institute of Structural Mechanics, Bauhaus Univ. Weimar, Germany

08:30-08:45 The Effect of the Number of Crossbridges on the Muscle Behavior #6705
Zahra Asgahour a, Mostafa Rostami b, 1 Young Research Club, Azad Univ. Science and Research Branch, Tehran, Iran; bBiomedical Engineering Department, Amirkabir Univ. of Technology, Tehran, Iran

08:45-09:00 A mathematical model of ovine skeletal muscle #4382
John Davidson a, Leo Cheng a, David Nickerson a, Paul Shorten b, Tanya Soboleva a, Ross Clarke b and Andrew Pullan a; a Bioengineering Institute, Univ. of Auckland, Auckland, New Zealand; bAgResearch Limited, Ruakura, New Zealand.

09:00-09:15 Effect of anatomical description on calculated muscle action in the deltoid #7362
S.E.M. Lawson, T. Lewis Morris, I. Flatters, G.R. Johnson; Centre for Rehabilitation and Engineering Studies (CREST), Univ. of Newcastle, Newcastle upon Tyne, UK

09:15-09:30 4D-Visualization of individual human upper arm musculature #6464
C. Kober a, L. Gallo a, Z. Kroł b, R. Sader a and H.-F. Zeilhofer a; a Faculty of Engineering and Computer Science, Univ. of Applied Science Osnabrueck, Germany; bUniversität Zürich, Switzerland; bUniversität Basle, Switzerland; Center of Advanced Studies in Cranio-Maxillo-Facial Surgery, Munich Univ. of Technology, Munich, Germany

09:30-09:45 How does posture affect lever arms of neck flexor and extensor muscles? #7413
Andrzej Przybyła a, Abhijit Mohite b, Simon Blease a, Michael A. Adams b, Patricia Dolan b; a Wide Open MRI Cardiff, Medtel Ltd., Cardiff, UK; b Dept. of Anatomy, Univ. of Bristol, Bristol, UK

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track

3.2 Locomotion and Falls-Mechanisms, Injuries and Interventions

3.2.1 Falls
Session Organizer/Chair: Jaap van Dieën
Wednesday, August 2
Room R1.046

08:15-08:30 A Theory for Identifying Loss of Balance: Analyses of Control Error and Compensatory Responses in Healthy Adults #7256
Alaa A. Ahmed, James A. Ashton-Miller; Biomechanics Research Laboratory, Univ. of Michigan-Ann Arbor, USA
08:30-08:45  Deficits in limb support contribute no less than instability to age-differences in falling #6516
Michael Pavol a, Feng Yang b, Yi-Chung Pai b; a Dept. of Nutrition & Exercise Sciences, Oregon State Univ., Corvallis, OR, USA; b Dept. of Physical Therapy, Univ. of Illinois at Chicago, Chicago, IL, USA

08:45-09:00  Effects of aging on lower extremity joint torque and muscle activation patterns during slip induced falls #7055
Thurman E. Lockhart and Jian Liu; Industrial & System Engineering, Virginia Tech, Blacksburg, USA

09:00-09:15  Concurrent control of multiple segments is required to avoid falling due to a slip induced during locomotion #5119
KL Troy, SJ Donovan, J Marone, ML Bareither, MD Grabiner; Dept. of Movement Sciences, Univ. of Illinois at Chicago, Chicago, USA

09:15-09:30  Identification of high-risk fallers by force capacity measures in the elderly #6829
M. Pijnappels a, J.C.E. van der Burg a, N.D. Reeves b and J.H. van Dieën a
a Institute for Fundamental and Clinical Human Movement Sciences, Vrije Universiteit Amsterdam, the Netherlands; b Institute for Biophysical and Clinical Research into Human Movement, Manchester Metropolitan Univ., Manchester, UK

09:30-09:45  The Biomechanical Demands of Stair Descent in Elderly and Young Adults # 6554
Reeves ND a, Spanjaard M b, Mohagheghi a, AA, Baltzopoulos V a and Maganaris CN a
a Institute for Biophysical & Clinical Research into Human Movement, Manchester Metropolitan Univ., Alsager, UK; b Institute for Fundamental and Clinical Human Movement Sciences, Vrije Univ., Amsterdam, The Netherlands

3.  Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.4.1 Spine Mechanics

Session Organizers: Tom Oxland, V. J.Goel
Wednesday, August. 2 Room R0.006

08:15-08:30  Minimizing apparatus-related errors during in vitro testing of multisegmental spine specimens #6580
Philippe Gédet, Paul A. Thistlethwaite, Stephen J. Ferguson; MEM Research Center, Univ. of Bern, Bern, Switzerland

08:30-08:45  Heparine perfusion does not improve mechanical recovery of intervertebral discs in vitro #6729
AJ van der Veen a, MG Mullender b, MN Helder c, PIJM Wuisman b,c, JH van Dieën d, TH Smit a,c; a Dept. of Physics and Medical Technology, b Dept. of Orthopedic Surgery, VU Med. Center, Amsterdam, Netherlands; c Skeletal Tissue Engineering Group Amsterdam, Netherlands; d Faculty of Human Movement Sciences, Vrije Universiteit, Amsterdam, Netherlands

08:45-09:00  Biphasic Deformation in Confined Compression of Bovine Spinal Cord #6651
Shigeru Tadano and Atushi Takeyama; Biomechanical Design, Division of Human Mechanical Systems and Design, Hokkaido Univ., Sapporo, Japan

09:00-09:15  Do flexion/extension postures affect the passive lumbar spine stiffness response to applied axial torque? #6946
Janessa D.M. Drake and Jack P. Callaghan; Dept. of Kinesiology, Faculty of Applied Health Sciences, Univ. of Waterloo, Canada

09:15-09:30  Changes in spinal load-sharing following vertebroplasty: effects of cement type, BMD and fracture severity #7420
J Luo a, D Skrzypiec c, P Pollintine a, MA Adams b, DJ Annesley-Williams a, P Dolan a
a Dept. of Anatomy, Univ. of Bristol, Bristol, UK; b Queen’s Medical Centre, Nottingham, UK

09:30-09:45  Role Of Reflex Dynamics In Spinal Stability #4068
K.P. Granata and K.M. Moorhouse; Musculoskeletal Biomechanics Laboratory, Dept. of Engineering Science & Mechanics; School of Biomedical Engineering & Science, Virginia Polytechnic Institute and State Univ.; Blacksburg VA, U.S.A.

3.  Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.5.1 Walking Dynamics
Session Organizers: Dieter Rosenbaum, Fabio Catani  
Chairs: Dieter Rosenbaum  
Wednesday, August 2  
Room R1.006

08:15-08:30 Locomotor-respiratory coordination dynamics and metabolic cost during walking at different stride frequencies #6138  
WJ McDermott, JG Remelius, REA Van Emmerik, J Hamill, PS Freedson  
Dept. of Exercise Science, Univ. of Massachusetts, USA

08:30-08:45 Magnetic resonance imaging used for estimation of subject specific lower limb inertial parameters #5613  
Silvia Fantozzi, Rita Stagni, Angelo Cappello; Dept. of Electronics, Computer Science and Systems, Univ. of Bologna, Italy

08:45-09:00 Metabolic cost and external mechanical work of walking after total ankle arthroplasty #6281  
Han Houdijk, David Vergouw, Kees Doets, Dirkjan Veeger; Institute for Fundamental and Clinical Human Movement Sciences, Vrije Universiteit, Amsterdam, The Netherlands; Dept. of Orthopaedic Surgery, Slotervaart Hospital, Amsterdam, The Netherlands

09:00-09:15 Cluster analysis to classify gait alterations in rheumatoid arthritis using peak pressure curves #5754  
C. Giacomozzi, F. Martelli, A. Schmiegel, A. Nagel, D. Rosenbaum; Istituto Superiore di Sanità, Rome, Italy; Univ. Hospital Muenster, Germany

09:15-09:30 Muscle-Actuated Simulation and Analysis of Swing-Phase Knee Motion during Normal Gait: Implications for the Treatment of Crouch Gait #7013  
Allison Arnold, Michael Schwartz, Darryl Thelen, Frank Anderson, Ilse Jonkers, Scott Delp; Dep. of Mechanical Engineering and Bioengineering, Stanford Univ., Stanford, CA, USA; Center for Gait and Motion Analysis, Gillette Children’s Specialty Healthcare, St. Paul, MN, USA; Dep. of Mechanical Engineering, Univ. of Wisconsin-Madison, Madison, WI, USA; Faculty of Kinesiology and Rehabilitation Sciences, KU Leuven, Belgium

09:30-09:45 Effects of reduced plantar-surface cutaneous sensation on gait over uneven terrain #5888  
Stephen D. Perry and Alison Radtke; Dept. of Kinesiology & Physical Education, Wilfrid Laurier Univ., Waterloo, ON, CAN

4. Implants for Trauma and Orthopedics-Joint ESB Track  
Chairs: Mark Taylor, Anthony Bull  
Wednesday, Aug. 2  
Room E1.03

08:15-08:30 Patellar Tracking During Navigated Total Knee Replacement #4701  
Claudio Belvedere, Fabio Catani, Alberto Leardini, Andrea Ensinib, José Moctezumac, Sandro Gianninib; Movement Analysis Laboratory, b Orthopedic Surgery Dept.-Istituti Ortopedici Rizzoli, Bologna, Italy; cStryker®-Leibinger, Freiburg, Germany

08:30-08:45 Development of an in-vivo technique for determination of 3D-kinematics of the patello-femoral and tibio-femoral joint in patients with TKA pre- and postoperatively #5246  
Rüdiger von Eisenhart-Rothe, Alexander Jovanovic, Thomas Vogl, Heiko Graichen; a Research Group for Kinematics and Biomechanics, Department of Orthopedic Surgery, University of Frankfurt, Germany; b Institute for Medical Informatics, GSF Neuherberg, Oberschleißheim, Germany; c Institute for Clinical and Interventional Radiology, University of Frankfurt, Germany; d Asklepios Orthopädische Klinik Lindenlohe, Schwandorf, Germany

08:45-09:00 Correlatian of Patellar Tendon Angle with femur antero-posterior translation after Total Knee Arthroplasty #6460  
Rita Stagni, Fabio Catani, Silvia Fantozzi, Alberto Leardini, DEIS, Univ. of Bologna, Bologna, Italy; 1OR, Bologna, Italy

09:00-09:15 Comparison of the In Vivo Surface Kinematics and Patellar Tendon Lines-of-Action in ACL-Deficient and Mobile Bearing Knees During Activity #4924  
Mei-Ying Kuo, Tsung-Yuan Tsai, Shi-Rong Hsu, Tung-Wu Lu, Horng-Chaung Hsu; a Institute of Biomedical Engineering, National Taiwan Univ., Taipei, Taiwan; b School of Physical Therapy, China Medical Univ., Taichung, Taiwan; c Dept. of Orthopaedics, China Medical Univ. Hospital, Taichung
09:15-09:30  
**An Elastic Meniscal Replacement #5980**
Xavier Sarabia, David N. Ku; SaluMedica, LLC, Atlanta, GA, USA

09:30-09:45  
**The effect of a mobile bearing total knee prosthesis on co-contraction during a step-up task #4755**
Eric Garling a, Nienke Wolterbeek b, Sanne Velzeboer b, Rob Nelissen a, Edward Valstar a,c, Caroline Doorenbosch b, Jaap Harlaar b; a Dept. of Orthopaedics Leiden Univ. Medical Center, The Netherlands; b Dept. of Rehabilitation Medicine, VU Univ. Medical Center, Amsterdam, The Netherlands; c Dept. of Biomechanics, Faculty of Mechanical Engineering, Delft Univ. of Technology, The Netherlands

5. **Occupational and Impact Injury Biomechanics**  
5.4.3 **Head/Brain Injury**  
**Session Organizers:** Susan Margulies, Karol Miller, David Meaney  
**Wednesday, August 2**  
**Room R0.058**

08:15-08:45  
**In vivo vs in vitro brain tissue properties #5496**
Lynne E. Bilston a, M. Greena, R. Sinkus b; a Prince of Wales Medical Research Institute, Univ. of New South Wales, Randwick, Sydney, Australia; b ESPCI, Paris, France

08:45-09:00  
**Local mechanical properties of the rat hippocampus measured by AFM indentation: Potential implications for traumatic brain injury #6129**
Benjamin S. Elkin, Evren U. Azealoglu, Kevin D. Costa, Barclay Morrison III; Dept. of Biomedical Engineering, Columbia Univ., USA

09:00-09:15  
**Large strain behaviour of brain tissue in shear and compression #4729**

09:15-09:30  
**Comparison of Intracranial Pressure Response to Cadaver Head Kinematics #5237**
Warren N. Hardy, Matthew J. Mason, Craig D. Foster, King, H. Yang, and Albert I. King Bioengineering Center, Wayne State Univ., Detroit, Michigan, USA

09:30-09:45  
**The indentation of brain tissues #5499**
Shaokoon Cheng a,b, Karl Leung b, Lynne Bilston a; a Prince of Wales Medical Research Institute, UNSW, Sydney, Australia; b Graduate School of Biomedical Engineering, Univ. of New South Wales, Sydney, Australia

6. **Sport Biomechanics-Joint ISB Track**  
6.3.1 **Footwear-Movement Control**  
**Session Organizers /Chairs:** Joe Hamil, Darren Stefanshyn  
**Wednesday, August 2**  
**Room D2.12**

08:15-08:45  
**Footwear traction and knee joint moments #6623**
Darren J. Stefanshyn; Human Performance Laboratory, Univ. of Calgary, Calgary, Canada

08:45-09:00  
**The challenge of finding safe household shoes for the elderly #5517**
Bridget J Munro, Julie R Steele; Biomechanics Research Laboratory, Univ. of Wollongong, Wollongong, Australia

09:00-09:15  
**Intrinsic foot motion measured in vivo during barefoot running #5476**
Arndt, A.a,b, Wolf, P.a, Nester, C.a, Liu, A.a, Jones, R.a, Howard, D.a, Stacoff, A.a, Lundgren, P.a, Lundberg, A.a; a Karolinska Univ. Hospital, Stockholm, Sweden; b Univ. College of Physical Education and Sport, Stockholm, Sweden; c Laboratory of Biomechanics, ETH, Zürich, Switzerland; d Centre for Rehabilitation & Human Performance, Univ. of Salford, Salford, England, UK

09:15-09:30  
**Soccer Shoe Evaluation #4423**
T. Sterzing & E. Hennig; Biomechanics Laboratory, Univ. of Duisburg Essen, Essen, Germany

09:30-09:45  
**The influence of induced fatigue on ground reaction forces and rearfoot motion in running #6375**
Thomas Milani, Günther Schlee, Kai Metzler; Technische Universität Chemnitz, Institut für Sportwissenschaft, Chemnitz, Germany
9. Tissue Engineering
9.1.4 Cell Biology and Biochemistry (Microscale)
Session Organizers: Christian Oddou, Alicia el-Haj
Chairs: E. Botchwey, P. Swider
Wednesday, August 2
Room 1.004

08:15-08:45  **Keynote: Bioreactor-based Bone Tissue Engineering #7816**
Edward Botchwey, Elisa Ferrante, Joseph Humphrey; \(^a\) Dept. of Biomedical Engineering, Univ. of Virginia, Charlottesville, USA; \(^b\) Dept. of Mechanical Engineering, Univ. of Virginia, Charlottesville, USA

08:45-09:00  **Development and validation of a dynamic flow perfusion bioreactor for use with compliant scaffolds in bone tissue engineering #4772**
Michael J. Jaasma, Niamh A. Flunkett, Fergal J. O'Brien; \(^a\) Dept. of Anatomy, Royal College of Surgeons in Ireland, Dublin, Ireland; \(^b\) Trinity Centre for Bioengineering, Trinity College Dublin, Ireland

09:00-09:15  **Biomechanical considerations in the development of an artificial bone scaffold #4198**
Dominique P. Pioletti, Luc Blecha, Laurence Mathieu, Pierre-Etienne Bourban, Marc-Olivier Montjovent, Lee Applegate, Pierre-Yves Zambelli, Pierre-François Leyvraz, Jan-Anders Månson; \(^a\) Laboratory of Biomechanical Orthopedics, EPFL, Lausanne, Switzerland; \(^b\) Laboratory of Polymer and Composite Technology, EPFL, Lausanne, Switzerland; \(^c\) Orthopedic Cell Therapy Unit, Univ. Hospital, Lausanne, Switzerland; \(^d\) Hôpital Orthopédique de la Suisse Romande, Lausanne, Switzerland

09:15-09:30  **Monitoring and quantifying formation of tissue engineered human bone in situ by microcomputed tomography #5585**
H Hagenmüller, T Kohler, S Hofmann, HP Merkle, L Meinel, R Müller; \(^a\) Institute for Biomedical Engineering, Univ. and ETH Zurich, Switzerland; \(^b\) Institute of Pharmaceutical Sciences, ETH Zurich, Switzerland

09:30-09:45  **A 3-D model for mechanical manipulation of tissue engineered bone, using polyurethane foam and osteoblastic MLO-A5 cells #5672**
Anuphan Sittichokechaewut, Anthony J. Ryan and Gwendolen Reilly; \(^a\) Dept. Engineering Materials, \(^b\) Dept. Chemistry, Univ. of Sheffield, UK

10. Cellular and Molecular Mechanics
10.4.1 Cytoskeletal, Nuclear, and Membrane Rheology
Session Organizers /Chairs: Dennis E. Discher, Andreas Bausch
Wednesday, August 2
Room R0.056

08:15-08:30  **Measuring protein conformational changes from single molecules up to cells – a proteomic method #6928**
Colin Johnson and Dennis E. Discher; Biophysical Engineering Lab, Univ. of Pennsylvania; Philadelphia, PA, USA

08:30-08:45  **Phase behaviour and micro-mechanical properties of crosslinked actin-networks #5568**
Oliver Lieleg, Andreas R. Bausch; Technische Universität München, Germany

08:45-09:00  **Active rheology in actin-myosin network #6332**
D. Mizuno, F. MacKintosh, and C. Schmidt; Dept. of Physics of Complex Systems, Vrije Universiteit Amsterdam, The Netherlands

09:00-09:15  **Linearity and superposition of cell mechanical properties #6536**
Philip Kollmannsberger, Daniel Prell, Johannes Pauly, Claudia Mierke, Ben Fabry; Center for Medical Physics and Technology, Biophysics Group, Univ. Erlangen-Nuremberg, Germany
11. Artificial Organs
Track Coordinators: Michel Jaffrin, Heinrich Schima
11.1.1 Technical Aspects of Hemodialysis
Session Organizers /Chairs: Michel Jaffrin, Jorg Vienken
Wednesday, August. 2
Room R1.002
08:15-08:45 Keynote: How to relate toxin mass transfer to fluid dynamics in hemodialysis #7698
P. Verdonck, J. Vierendeels, S. Eloot; Institute of Biomedical Technology, "Hydraulics Laboratory; "Fluid Mechanics Laboratory, Ghent Univ., Gent, Belgium
08:45-09:00 Computer modelling of internal filtration in hemodialyzers #5984
Gianfranco B. Fiore, Gualtiero Guadagni, Riccardo Vismara, Claudio Ronco
"Dept. of Bioengineering, Politecnico di Milano, Milan, Italy; "Research Division, Estror S.p.A., Milan, Italy; "Dept. of Nephrology, St. Bortolo Hospital, Vicenza, Italy
09:00-09:15 Computational Methodology for Accurately Predicting and Evaluating the Mass Transfer Characteristics and Performance in a Hemodialyzer #7781
Cristian R. Farias and Amador M. Guzmán; Departamento de Ingeniería Mecánica, Universidad de Santiago de Chile, Santiago, Chile
09:15-09:30 Profiled-Hfr: A New Mathematical Model For Sodium And Uf Profile Elaboration #7308
L. Coli, M. Ursino, E. Magosso, P. Capriotti, G. Donati, G. Cianciolo, L. Panicali, G. Ruggeri, V. Nastasi, M. Piccari, S. Stefoni
"Nephrology, Dialysis and Renal Transplantation Unit, S. Orsola Univ. Hospital, "Dept. of Electronic, Computer Science and Systems, Univ. of Bologna, Italy

13. Respiratory Mechanics
13.4 Pulmonary Cell Mechanics
Session Organizers /Chair: Daniel Isabey, Ning Wang
Wednesday, August. 2
Room R2.088
08:15-08:45 Keynote: Advances in pulmonary cell mechanics: Mechanical properties, structure and function # 6389
Daniel Isabey; Biomécanique Cellulaire et Respiratoire, Inserm UMR651 et Université Paris XII Val-de-Marne, Faculté de Médecine, Créteil, France
08:45-09:00 Central role of prestress in stress propagation in airway smooth muscle cells # 7732
Ning Wang; Univ. of Illinois at Urbana-Champaign, IL, USA
09:00-09:15 Plasma Membrane Stress Failure and Repair in Ventilator Injured Lungs #4370
Rolf D. Hubmayr; Mayo Clinic College of Medicine; Dept. of Physiology and Biomedical Engineering. Rochester, MN, USA
09:15-09:30 Cell Traction and Migration in 3D Matrices #6613
Ben Fabry; Biophysics group, Univ. of Erlangen-Nuernberg, Erlangen, Germany
09:30-09:45 Matrix Elasticity Directs Stem Cell Differentiation #6919
Adam J. Engler, Shamik Sen, and Dennis E. Discher; Pennsylvania Muscle Institute and Biophysical Engineering Lab, Univ. of Pennsylvania, Philadelphia, PA, USA
14. Cardiovascular Mechanics
14.5.2 Atherosclerosis and Aneurysms 1
Session Organizers /Chairs: Charles A. Taylor, Francesco Migliavacca
Wednesday, August 2
Room G1.27
08:15-08:45  Keynote: Atherosclerosis and Aortic Aneurysms #6694
Christopher K. Zarins; Stanford Univ., Stanford, CA
08:45-09:00  Towards the integration of heterogeneous data: computational fluid dynamics as part of
a processing chain in the context of risk assessment for cerebral aneurysms #6142
Alejandro Frangi¹, Rod Hose², Juan Cebra¹, Daniel Rufenacht³
¹University Pompeu Fabra, Barcelona, ²Medical Physics, Univ. of Sheffield, ³George Mason Univ. USA, ⁴Univ. Hospital Geneva
09:00-09:15  Wall thickening and its relation to local haemodynamic parameters in femoral bypass
grafts #4490
Alexander Augst¹, Mark Jackson², Shunzhi Zhao¹, Alun D Hughes², Simon A Thom², X. Yun Xu³; ¹Dept. of Chemical Engineering ; ³NHLI, International Centre for Circulatory
Health, St Mary’s Hospital ; Imperial College London, UK
09:15-09:30  Association of biophysical forces with impaired remodeling mechanisms of the
abdominal aortic aneurysm wall #5514
David A. Vorp¹,²,³, Douglas W. Chew¹,², Naoya Sakamoto¹,², Makiko Sakamoto¹,², Michel S. Makaroun¹; Depts of ¹Surgery and ²Bioengineering, and ³McGowan Institute for
Regenerative Medicine, Univ. of Pittsburgh, Pittsburgh, PA, USA
09:30-09:45  Fusion of imaging and computational biomechanics: A promising approach for improved
analysis of the biomechanics of atherosclerotic plaques #7187
Gerhard A. Holzapfel¹,²,³, Martin Auer², Dimitrios E. Kiousis³, Thomas C. Gasser³; ¹Royal
Institute of Technology, School of Engineering Sciences, Stockholm, Sweden; ²Graz Univ. of
Technology, Computational Biomechanics, Graz, Austria

14. Cardiovascular Mechanics
14.6.1 Computational Modelling
Session Organizers /Chairs: David Steinmann
(Incorporating presentations from Thread 1 Computational Methods in Biomechanics and Mechanobiology
Thread organizers: Gerhard A. Holzapfel, Tim David)
Wednesday, Aug 2
Room R1.007
08:15-08:45  Direct simulation of transition to turbulence in steady and pulsatile flow in a model
stenotic geometry #5969
Spencer Sherwin¹ & Hugh Blackburn²; ¹Dept. of Aeronautics, Imperial College London, UK
²CSIRO, Manufacturing and Infrastructure Technolody, Highted, Australia
08:45-09:00  Flow behavior and blockage effects in stenosed arteries #7371
Martin Griffith³, Thomas Leweke¹, Kerry Hourigan³, Mark Thompson³, Warwick Anderson⁴
³Fluids Laboratory for Aeronautical and Industrial Research (FLAIR), Dept. of Mechanical
Engineering, and ⁴School of Biomedical Sciences, Monash Univ., Melbourne, Australia;
IRPHE, CNRS/Universités Aix-Marseille, France
09:00-09:15  Patient-specific MR image-based studies of stenosed carotid bifurcations #4640
NB Wood¹, G Soloperto¹, SE Bashford¹, XY Xu¹, AD Hughes¹, SA Thom¹.
¹Chemical Engineering, South Kensington Campus, Imperial College London, UK; ¹NHLI,
International Centre for Circulatory Health, Imperial College London, UK
09:15-09:30  Unsteady and Three-dimensional Simulation of Blood Flow in Aortic Dissection
Reconstructed from CT images # 7307
14. Cardiovascular Mechanics

14.7.1 Coronary Circulation

Chairs: Shmuel Einav, Juichiro Shimizu

Wednesday, August 2

Room G2.36

08:15-08:45  Keynote: Coronary Circulation #7889
Shmuel Einav; Tel Aviv Univ. and Stony Brook Univ.

08:45-09:00  Morphology-Based Stochastic Reconstruction of the Pig Coronaries in a 3D Heart Model #5910
Benjamin Kaimovitz\(^ab\), Ghassan S. Kassab\(^b\), Yoram Lanir\(^c\), \(^a\)Faculty of Biomedical Engineering, Technion – I.I.T., Haifa, Israel; \(^b\)Dept. of Biomedical Engineering, Univ. of California, Irvine, California

09:00-09:15  Non-invasive assessment of flow-related geometrical risk factors for atherosclerosis in human coronary bifurcations by MSCTA #5871
Alina G. van der Giessen\(^a,b\), Jolanda J. Wentzel\(^a\), Carlos A.M. van Mieghem\(^a\), Nico Mollet\(^a\), Anton F.W. van de Steen\(^a\), Pim J. de Feyter\(^a\), Frank J.H. Gijsen\(^a\)
\(^a\)Depts. of Biomedical Engineering, Cardiology and Radiology, ErasmusMC Rotterdam, the Netherlands; \(^b\)Dept. of Biomedical Engineering, Eindhoven Univ. of Technology, Eindhoven, the Netherlands

09:15-09:30  In-Stent Restenosis Measurements By MRI #6012
Edward Walsh\(^a\), Brigitta Brott\(^b\), Ramakrishna Venugopalan\(^c\), Andreas S Anayiotos\(^d\)
\(^a\)Dept. of Neuroscience, Brown Univ., Birmingham, Alabama, USA; \(^b\)Division of Cardiovascular Disease, Univ. of Alabama, Birmingham, Alabama, USA; \(^c\)Codman and Shurtleff (J&J), Raynham, MA, USA; \(^d\)Dept. of Biomedical Engineering, Univ. of Alabama, Birmingham, Alabama, USA

09:30-09:45  Sensitivity of flow dynamics to reconstruction errors in systemic and coronary vessels #5981
Bioflow Group, Dept. of Aeronautics, Imperial College London, UK

14. Cardiovascular Mechanics

14.11.1 Mechanobiology of Vascular Walls and Cells

Session Organizers/Chairs: Masaaki Sato, Mort Friedman

Wednesday, August 2

Room G0.01

08:15-08:30  Multiscale analysis of shear-induced stresses at endothelial cell focal adhesions #7374
Peter J. Butler, Amit Bhatnagar, Michael C. Ferko; Cell and Tissue Mechanotransduction Lab., The Pennsylvania State Univ., Dept. of Bioengineering, Univ. Park, PA, USA

08:30-08:45  Differentiation of two types of mechanosensors in endothelial cells #5510
Masahiro Sokabe\(^a,b,c\), Kimihide Hayakawa\(^b\), Hitoshi Tatsumi\(^c\)
\(^a\)Dept. of Physiology, Nagoya Univ. Graduate School of Medicine, Nagoya, Japan; \(^b\)ICORB/SORST Cell Mechanosensing, JST, Nagoya, Japan; \(^c\)Dept. of Molecular Physiology, NIPS, NINS, Okazaki, Japan

08:45-09:00  Flow-activated chloride channels in aortic endothelium: sensitivity and functional implications #6792
Mamta Gautam\(^a\), Yue Shen\(^a\), Twanda L. Thirkill\(^b\), Gordon C. Douglas\(^b\), Abdul I. Barakat\(^a\)
09:00-09:15 Unique endothelial gene expression sensitivities to shear stress magnitude and spatial gradient #6607
Jeffrey A. LaMack, Morton H. Friedman; Dept. of Biomedical Engineering, Duke Univ.,

09:15-09:30 Distinguishing endothelial responses to impingement force, wall shear stress, and wall shear stress gradient #6315
Eleni Metaxa ab, John Kolega d, Michael P Szymanski ab, ZhiJie Wang ab, Daniel D Swartz bc, Hui Meng ab, e; aDept. of Mechanical and Aerospace Engineering, State Univ. of New York at Buffalo, Buffalo, USA; bToshiba Stroke Research Center, State Univ. of New York at Buffalo, Buffalo, USA; cDept. of Pediatrics, State Univ. of New York at Buffalo, Buffalo, USA; dDept. of Anatomy and Cell Biology, State Univ. of New York at Buffalo, Buffalo, USA; eDept. of Neurosurgery, State Univ. of New York at Buffalo, Buffalo, USA

09:30-09:45 Endothelial cell morphology and response to shear stress in an asymmetric stenosis model #5168
Leonie Rouleau a, Monica Farca a, Jean-Claude Tardif MC, Eric Thorin PhD b, Rosaire Mongrain PhD c; a Dept. of Chemical Engineering, McGill Univ., Montreal, Canada; bDept. of Mechanical Engineering, McGill Univ., Montreal, Canada; cMontreal Heart Institute, Montreal, Canada

15. Microcirculation
15.3.1 Flow in Microchannels and Microvessel Networks: Flexible Particles (Cells, Vesicles) and Cell-Vascular Wall Interactions
Session Organizers /Chairs: D. Barthès-Biesel, S. Weinbaum
Wednesday, August 2
Room R1.005

08:15-08:45 Simulation of red blood cell deformation and radial migration in microvessels #6289
Timothy W. Secomb ab, Axel R. Pries c; a Dept. of Physiology, Univ. of Arizona, Tucson, AZ, USA; bDept. of Physiology, Berlin, Germany

08:45-09:00 Confocal micro-PIV measurements of blood flow in microchannels #6543

09:00-09:15 Red blood cell dynamics, deformation and separation in microfluidic devices #7227
Manouk Akbarian ab, Magalie Faivre c, and Howard A. Stone d; a Laboratoire des Colloïdes, Verres et Nanomatériaux, UMR UM2/CNRS 5587, CC26, Université Montpellier 2, Monpellier, France; b Division of Engineering and Applied Sciences, Harvard Univ., Pierce Hall, Cambridge, MA, USA

09:15-09:30 Observation of deformation of human red blood cell passing through a micro-channel array as a model of human blood capillary #6697
Tsutomoi Tajikawa a, Kenkichi Ohba b, and Chihiro Sakakibara b, a Dept. of Mech. Systems Eng., Kansai Univ., Osaka, Japan; b Graduate school of Kansai Univ., Osaka, Japan

09:30-09:45 Dynamic deformation behavior of normal human red blood cells freely suspended in a sinusoidally oscillating quasi-Couette shear flow: Elastic stretching and viscoelastic recovering model #4366
Nobuo Watanabe, Hiroyuki Kataoka, and Setsuo Takatani; Dept. of Artificial Organs, Institute of Biomaterials and Bioengineering, Tokyo Medical and Dental Univ., Tokyo, Japan

17. Biomechanics in Nature
17.4.4 Swimming and Flying
Session Organizers: Charlie Ellington, Johann von Leeuwen
Chairs: Johann von Leeuwen, Malcolm Gordon
(Incorporating presentations from Thread 2: Flow-Structure Interation; Thread Organizers: Chris Bertram, Ross Ethier, Charlie Ellington)
Wednesday, August 2
Room R1.087
08:15-08:30 Dynamic flight stability and control of a hovering hoverfly #6253
Mao Sun and Ji Kang Wang; Institute of Fluid Mechanics, Beijing Univ. of Aeronautics & Astronautics, Beijing, P. R. China

08:30-08:45 Dynamics of flapping flight control: birds versus insects #6055
Graham K. Taylor; Oxford Univ., Dept. of Zoology, Oxford, UK

08:45-09:00 Determination of vortex structures in the wake of swimming and flying animals #5260
Jiří Peng a, John Dabiri b, c; a Bioengineering & b Graduate Aeronautical Laboratories, California Institute of Technology, Pasadena, CA, USA

09:00-09:15 Study of oscillatory lift-based propulsion by flapping airfoil with flexible trailing edge #7430
Sachin Y. Shinde & Jaywant H. Arakeri; Indian Institute of Science, Bangalore, India

09:15-09:30 Influence of wing kinematics on performance in hovering insect flight #5084
F. M. Bos a, D. Lentink b, W. van Oudheusden a, H. Bijl b
a Aerospace Engineering, Delft Univ. of Technology, Delft, The Netherlands,
b Experimental Zoology, Wageningen Univ., Wageningen, The Netherlands

09:30-09:45 Propulsive efficiency of 2D flexible flapping foils #6806
Olivier Boiron a, Jiri Polansky b, Jiří Pokorný b; a IRPHE UMR 6594, Equipe de Biomécanique, Marseille, France; b Univ. of West Bohemia, Pilsen, Czech Republic

18. Trends in Cranial and Spinal Biomechanics
18.1.2 Flow in cerebral aneurysms
Session Organizers /Chair: B. Lieber, Hiroshi Ujiie
Wednesday, August. 2
Room R2.091

08:15-08:45 Keynote: IV validation of pulsatile flow in a patient-specific aneurysm CFD model #6616
Matthew D. Ford a, b, Hristo N. Nikolov a, Jaques S. Milner a, David W. Holdsworth a, b, David A. Steinman a, b, c; a Imaging Research Laboratories, Robarts Research Institute, London, Canada; b Dept. of Medical Biophysics, The Univ. of Western Ontario, London, Canada; c Dept. of Mechanical & Industrial Engineering, Univ. of Toronto, Toronto, Canada

08:45-09:00 Hemodynamics between wall shear stress and development process of aneurysm around anterior communicating artery #4671
Ryuhei Yamaguchi a, Kenichi UMEZAWA a, Jun NISHIJMA b, and Hiroshi UJIIE b
a Dept. of Mechanical Engineering, Shibaura Institute of Technology, Tokyo, Japan; b Dept. of Neurosurgery, Tokyo Women’s Medical Univ., Tokyo, Japan.

09:00-09:15 Hemodynamics in a saccular aneurysm located in the PICA artery: wall shear stress as possible index for assessing risk of rupture #4205
Gabriel Arevalo, Alvaro Valencia; Dept. of Mechanical Engineering, Universidad de Chile, Santiago, Chile

09:15-09:30 Haemodynamic Effects of Micro catheterisation for the Coiling of Cerebral Aneurysms #4879
N. M. P. Kakalis a, M. T. D. Soroka a, b, A. Mitsos c, P. Summers c, J. V. Byrne c, Y. Ventikos c
a Fluidics and BioComplexity Group, Dept. of Engineering Science & Institute of Biomedical Engineering, Univ. of Oxford, Oxford, UK; b Dept. of Mechanical and Aerospace Engineering, Princeton Univ., UK; c Dept. of Neuroradiology & Radcliffe Infirmary, Univ. of Oxford, UK

09:30-09:45 Three Dimensional Measurements Of Cerebral Aneurysms And Vessel Size #7143
Makoto Ohta a, b, Yann Lachenal b, Luca Augsburger b, German Abdo b, Hasan Yilmaz c, Naoko Fujimura c, Drazenko Babic c, Pedro Lylly d, Daniel A. Rüfenacht b, a Biofluid Lab. Institute of Fluid Science, Tohoku Univ., Sendai, Japan; b Neuroradiology, Univ. Hospitals of Geneva, Geneva, Switzerland; c Clinical Science Vascular Cardio-Vascular Dept., Philips Medical Systems, Best, The Netherlands; d ENERI, Buenos Aires, Argentina

19.5 Biothermomechanics
Session Organizer /Chair: Yoed Rabin
Fracture formation in vitrified thin films of cryoprotectants and its application to cryopreservation #4517
Yoed Rabin, Paul S. Steif, Katherine C. Hess, Jorge L. Jimenez-Rios, and Matthew C. Palastro
Biothermal Technology Laboratory, Dept. of Mechanical Engineering, Carnegie Mellon Univ., Pittsburgh, PA, USA

Continuum mechanics prediction of fracture progression in vitrified DP6 and its application to cryopreservation #4519
Paul S. Steif, Matthew C. Palastro, Yoed Rabin; Biothermal Technology Laboratory, Dept. of Mechanical Engineering, Carnegie Mellon Univ., Pittsburgh, PA, USA

Experimental study of viscoelasticity effects in cryopreservation of blood vessels by means of vitrification #4878
Jorge L. Jimenez-Rios, Paul S. Steif, and Yoed Rabin; Biothermal Technology Laboratory, Dept. of Mechanical Engineering, Carnegie Mellon Univ., Pittsburgh, PA, USA

Changes in arterial biomechanics following heat and cold treatments #6153
Ramji T. Venkatasubramanian a and John C. Bischof a,b,c; Depts. of Mechanical Engineering a, Biomedical Engineering b and Urologic Surgery c, Univ. of Minnesota, Minneapolis, USA

Structure-property relationships for assessing tissue quality to aid diagnosis of prostate disease #6661
T.H.J. Yang a, S.K.W. Leung b, R.L. Reuben a, F.K. Habib b, S.A. McNeill a, A. Schneider d, G. McBride e, R. Stevens c; a Heriot-Watt Univ., School of Engineering and Physical Sciences, Edinburgh, UK; b Univ. of Edinburgh, Prostate Research Group, Edinburgh, UK; c Western General Hospital, Dept. of Urology, Edinburgh, UK; d Rutherford Appleton Laboratory, CCLRC, Didcot, UK

VEGF-induced Microvessel Hyperpermeability and Tumor Cell Adhesion Can be Abolished by cAMP in vivo #4385
Bingmei M. Fu a,b, Shang Shen a; a Dept. of Mechanical Engineering, Univ. of Nevada, Las Vegas, Las Vegas, NV, U.S.A.; b Dept. of Biomedical Engineering, The City Univ. of New York, New York, NY, U.S.A.

Tumor vessel abnormalities affect blood cell dynamics and flow distribution #7273
Lance L. Munn a, Aaron W. Mulivor a, Michael Dupin a, Sergey S. Shevkoplyas b and Chenghai Sun c; a Massachusetts General Hospital, Charlestown, MA, USA; b Dept. of Chemistry, Harvard Univ., Cambridge, USA; c Exa Corp., Burlington, MA, USA

Inflammation and Cancer: Role of Intercellular and Intracellular Interactions Mediated by Mechanics and Chemistry #5188
Cheng Dong, Shile Liang, Margaret Slattery, Hsin-Hsin Peng; Dept of Bioengineering and the Huck Institutes of Life Sciences; The Pennsylvania State Univ., Pennsylvania, U.S.A.

2D Kinetics Of Integrin and ICAM-1 Bindings Between Leukocytes and Melanoma Cells #7622
Shile Liang a, Changliang Fu b, Desi Wagner a, Cheng Dong a, and Mian Long a; a Dept. of Bioengineering, The Pennsylvania State Univ., Pennsylvania, USA; b National Microgravity Laboratory, Institute of Mechanics, Chinese Academy of Sciences, Beijing, P. R. China

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.7.1 Computational Biomechanics and Mechanobiology of Musculoskeletal Soft Tissues
Session Organizers/Chairs: Richard E. Debski, Jeffrey A. Weiss
Wednesday, August 2
Room G0.43
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<th>Time</th>
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<tr>
<td>08:15-08:45</td>
<td>Keynote: Computational methods for solute transport in soft tissues and tissue constructs under static and dynamic loading #5804</td>
<td>Gerard A. Ateshian, Nadeen O. Chahine, Victoria I. Wei, Michael B. Albro, Clark T. Hung; Dept. of Biomedical Engineering and Dept. of Mechanical Engineering, Columbia Univ., New York, USA</td>
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<td>08:45-09:00</td>
<td>Biphasic Finite Element Predictions for Region-Specific Meniscus Cell-Matrix Mechanics #5060</td>
<td>Maureen L. Upton, Farshid Guilak, Tod A. Laursen, Lori A. Setton; Dept. of Biomedical Engineering, Duke Univ., Durham, NC, USA; Dept. Surgery, Duke Univ. Medical Center, Durham, NC, USA; Dept. Environmental and Civil Engineering, Duke Univ., Durham, NC, USA</td>
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<td>09:00-09:15</td>
<td>Micro-structural Models of Articular Cartilage #6309</td>
<td>Salvatore Federico and Walter Herzog; Faculty of Kinesiology, Univ. of Calgary, Calgary, Canada; Faculties of Kinesiology, Engineering and Medicine, Univ. of Calgary, Calgary, Canada</td>
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<tr>
<td>09:15-09:30</td>
<td>Applying constraints in finite element modelling of articular structures #5636</td>
<td>S.D. Masouros, A.M.J. Bull, U.N. Hansen, A.A. Amis; Depts. of Bioengineering, Mechanical Engineering and Musculoskeletal Surgery, Imperial College London, UK</td>
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<tr>
<td>09:30-09:45</td>
<td>Numerical modelling of cartilage based on compression tests #4482</td>
<td>Francesca Gervaso, Giancarlo Pennati, Pasquale Vena, Federica Boschetti; Laboratory of Biological Structure Mechanics, Dept. of Structural Engineering Politecnico di Milano, Milan, Italy</td>
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### Thread 1: Computational Methods in Biomechanics and Mechanobiology

**T1.14.2 Image-based anatomical modelling for CAD/FEA applications**

**Session Organizer /Chair:** Panos Diamantopoulos  
**Wednesday, August 2**  
**Room R2.007**

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<th>Session Title</th>
<th>Organizers</th>
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<tr>
<td>08:15-08:30</td>
<td>Creation of accurate 3D models of reconstructed bones and joints for evaluations of surgical fixation techniques by finite element analysis #7678</td>
<td>Rajshree Mootanah; Bioengineering Research Group, Dept. of Design and Technology, Faculty of Science and Technology, Anglia Ruskin Univ., Chelmsford, Essex, UK</td>
</tr>
<tr>
<td>08:30-08:45</td>
<td>FE-enhanced computer assisted surgery: Application to femoral nailing #7659</td>
<td>P. Büchler and S. Olsen; MEM Research Center, Univ. of Bern, Switzerland</td>
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<tr>
<td>08:45-09:00</td>
<td>Is high accuracy anatomical modelling necessary for computer simulation of implant loosening in total hip replacement? #6546</td>
<td>A.B. Lennon, J.R. Britton, R.F. MacNicol, P.J. Kenny, and P.J. Prendergast; Trinity Centre for Bioengineering, Parsons Building, Trinity College Dublin, Ireland; Dept. of Orthopaedic Surgery, Cappagh National Orthopaedic Hospital, Dublin, Ireland</td>
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<tr>
<td>09:00-09:15</td>
<td>Application of the finite element method to investigate the stability of acetabular press-fit cups during impingement #7052</td>
<td>Christian Voigt, Matthias Ellguth, Erwin Steinhauser, Carsten Klön, Rainer Bader; Dept. of Mechanical and Power Engineering, Leipzig Univ. of Applied Sciences, Leipzig, Germany; Dept. of Orthopaedic Surgery, Technical Univ. of Munich, Munich, Germany; Dept. of Orthopaedic Surgery, Univ. of Rostock, Rostock, Germany</td>
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<td>09:15-09:30</td>
<td>A general geometrical modeling procedure for biomechanical simulations, supporting pre-operative planning and post-operative examination #6671</td>
<td>Dipl.-Ing. E. Karatsis, Dipl.-Ing. I. Chalkidis, Dipl.-Ing. T. Charamis, Prof. Dr.-Ing. G. Athanasiadis; Laboratory of Machine Elements &amp; Machine Design, Dept. of Mechanical Engineering, Aristotle Univ. of Thessaloniki, Thessaloniki, Greece</td>
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<td>09:30-09:45</td>
<td>On image-based meshing: New tools for generating numerical models from scan data #7475</td>
<td>Philippe Young, Terry Beresford-West; School of Engineering and Computer Science, Univ. of Exeter, Exeter; Simpleware Ltd., Exeter, UK</td>
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### Thread 2: Flow-Structure Interactions
T2.1.3 Cardiovascular Mechanics-FSI Algorithm Development in the Cardiovascular System

**Chairs:** Ross Ethier, Pascal Verdonck

**Wednesday, August 2**

**Room R0.005**

08:15-08:30  *Modeling and Computer Simulation of Elastic Red Blood Cell Flow #5529*
Shigeo Wada, Yoshihata Kitagawa, Ken-ichi Tsubota, Takami Yamaguchi; Dept. of Bioengineering and Robotics, Graduate School of Engineering, Tohoku Univ., Sendai, Japan

08:30-08:45  *Influence of elastic walls on the flow dynamics in a carotid artery using Smoothed Particle Hydrodynamics #5589*
Matt Sinnott, Paul Cleary and Mahesh Prakash; *CSIRO* Mathematical and Information Sciences, Melbourne, Australia

08:45-09:00  *Vascular fluid-structure-interaction using Fluent and Abaqus software #7435*
Lieve Lanoye\(^a\), Jan Vierendeels\(^b\), Patrick Segers\(^b\), Pascal Verdonck\(^b\)
\(^a\)Institute Biomedical Engineering, Ghent Univ., Ghent, Belgium; \(^b\)Dept. of Flow, Heat and Combustion Mechanics, Ghent Univ., Ghent, Belgium

09:00-09:15  *Absorbing boundary conditions for pulse propagation in arteries #6458*
A. Moura, F. Nobile, M. Prosi, L. Formaggia; MOX - Laboratory for Modeling and Scientific Computing, Politecnico di Milano, Italy

09:15-09:30  *Large-scale subject-specific simulations of blood flow in deformable arteries using a coupled-momentum formulation #6982*
C. A. Figueroa\(^a\), I. E. Vignon-Clementel\(^b\), K. E. Jansen\(^b\), C. A. Taylor\(^c\)
\(^a\)Dept. of Mechanical Engineering, \(^b\)Depts. of Bioengineering and Surgery, Stanford Univ., Stanford, CA, USA; \(^c\)Dept. of Mechanical, Aeronautical & Nuclear Engineering, Rensselaer Polytechnic Institute, Troy, NY, USA

09:30-09:45  *Quantitative Analysis Evaluation of Flow Characteristics in Elastic Artery with Fluid-Structure Interaction Model Using Real Pulsatile Pressure Waveforms #5733*
H. N. Oscuii \(^a\), M. T. Shadpoor \(^a\), F. Ghalichi \(^b\); \(^b\)Biomedical Eng. Faculty, Amirkabir Univ., Tehran, Iran; \(^b\)Biomedical Eng. Group, Sahand Univ. of Technology, Tabriz, Iran

**Plenary Lecture**

**Wednesday, Aug. 2**

10:00-10:30  

G0.01  

**Regenerative Medicine: From Engineering to Clinical Applications #7716**  
*Prof. J.F. Stoltz, Univ. Hospital Bioengineering Group, Nancy, France*

**ESB SM Perren Award session and ESBiomat session**

10:00-10:30  

R1.049
Wednesday, Aug. 2
11:00-12:30

1. Bone Mechanics – Joint ESB Track
1.4.2 Bone Remodelling
Session Organizer: David Fyhrie
Chair:

Wednesday, August. 2
Room R0.055

11:00-11:15 Evaluation Of Femoral And Periacetabular Bone Remodeling After Total Hip Arthroplasty Using Quantitative Computed Tomography In-Vivo #4766
LA Mueller, A Kress, TE Nowak, C Ehrmann, R Forst, R Schmidt, a Dept. of Orthopaedic Surgery, Univ. of Erlangen-Nuernberg, Erlangen, Germany; b Clinic of Trauma-Surgery and Orthopaedics, Staatliche Kliniken Esslingen, Esslingen, Germany; c Clinic of Trauma-Surgery, Johannes Gutenberg Univ., Mainz, Germany

11:15-11:30 Internal fixation of femoral neck fractures: Contributions and limitations of biomechanical models for the understanding of osteosynthesis failure and bone remodelling #5095
Tobias Ebinger, Stefan Diebels, Holger Steeb, Thorsten Tjardes
a Chair of Applied Mechanics, Saarland Univ., Saarbrücken, Germany, b Medical Center Cologne Merheim, Chair of Trauma and Orthopedic Surgery, Univ. Witten/Herdecke, Köln, Germany

11:30-11:45 Influence of enhanced proximal press-fit on bone remodelling after implantation of a cementless tapered stem # 6249
K. Knahr, L. Karamat; Orthopädisches Spital Wien-Speising, Wien, Austria

11:45-12:00 The poroparameters for evaluation of structural-osteoinductive and mechanical properties of bone-implant porous coating interface. Part 1. Theoretical background on the basis of the poroelastic model of bone # 6279
Janusz Mielniczuk, Ryszard Uklejewski, Mariusz Winiecki, Piotr Rogala
a Chair of Machine Design Fundamentals, Poznan Univ. of Technology, Poznan, Poland, b Dept. of Fundamentals of Medical Bioengineering, Kazimierz Wielki Univ. of Bydgoszcz, Poland, c Dept. of Pediatric Endocrinology, Poznan Univ. of Medical Sciences, Poznan, Poland, d Spine Surgery, Orthopaedics and Traumatology Dept., Poznan Univ. of Medical Sciences, Poznan, Poland

12:00-12:15 Simultaneous proximal-distal tunneling in osteon development #5017
René F.M. van Oers, Ronald Ruimerman, Peter A.J. Hilbers, Rik Huiskes

12:15-12:30 Bone loss after OVX is associated with local relative strain, not with global absolute strain #5059
J.H. Waarsing, J.C. van der Linden, H. Weinans; Dept. of orthopaedics, Erasmus Medical Center, Rotterdam, The Netherlands

12:30-12:45 Scaling musculoskeletal peak stress: bone growth and animal's critical size #5742
Valery B. Kokshenev; Departamento de Fisica, Universidade Federal de Minas Gerais, Brazil

12:45-13:00 Anabolic Fluid Flow Stimulation is Responsible for Trabecular and Cortical Bone Formation as a Manner of Frequency and Magnitude Specific #7521
Yi-Xian Qin, Hoyan Lam, Lukasz Orzechowski; Orthopaedic Biomechanics and Bioinstrumentation Laboratory, Department of Biomedical Engineering, Stony Brook University, Stony Brook, NY

2 Musculoskeletal Mechanics-Joint ISB Track
2.3.5 Motor Control of Human Movement
Session Organizers /Chairs: W. I. Schoellhorn, Keith Davids
Wednesday, August. 2
Room R1.049
11:00-11:15  From degrees of freedom to dimensions and entropies for characterizing human movement #6267
Gottfried Mayer-Kress a, Yeou-Teh Liu b, Karl M. Newell a; a Dept. of Kinesiology, Penn State Univ., Univ. Park, USA; b Dept. of Physical Education, National Taiwan Normal Univ., Taipei, Taiwan

11:15-11:30  Bifurcations in motor solutions to the continuous boxing hand-striking task: Some spatial, sequential and temporal characteristics #5301
Robert Hristovski a, Keith Davids b; a Faculty of Physical Culture, Univ. of St. Cyril and Methodius, Skopje, Republic of Macedonia; b School of Human Movement Studies; Queensland Univ. of Technology, Brisbane, Australia

11:30-11:45  The dynamics of interpersonal coordination as emergent properties in sport #4588
Duarte Araújo a, Pedro Passos a, b, Keith Davids a; a Faculty of Human Kinetics; Technical Univ. of Lisbon, Portugal; b Lusófona Univ. of Humanities and Technologies, Lisbon, Portugal

11:45-12:00  Identifying deterministic and variable components of human motor control systems #7130
T. D. Frank; Institute of Theoretical Physics, Univ. of Muenster, Muenster, Germany

12:00-12:15  The biomechanical walk #7931
Ralph Schleer; Max-Planck-Institute for Human Brain and Cognitive Science, Munich, Germany

2 Musculoskeletal Mechanics-Joint ISB Track
2.7.6 Musculoskeletal Modelling (Clinical Biomechanics)  
Wednesday, August 2
Chair: Bart Koopman  
Room R0.002
11:00-11:15  Short and long term riding capability of paraplegics during functional electrical stimulation propelled cycling – A computer simulation and experimental study #6441
J. Szecsi, P. Krause, S. Krafczyk, T. Brandt, and A. Straube; Center for Sensorimotor Research, Dept. of Neurology, Ludwig-Maximilians Univ., Munich, Germany

11:15-11:30  Progress in the Development of a System for Early Detection of Deep Pressure Sores Associated With Sitting: Results from Control Subjects # 4061
Eran Linder-Ganz a, Ziva Yizhar b, Amit Gefen a; Depts. Of a biomedical Engineering And Physical Therapy, Tel Aviv Univ., Tel Aviv, Israel

11:30-11:45  Vienna 2.2 knee joint simulator for long term in vitro testing #5562
Gobert von Skrbensky a, Roland Huber b; a Medical Univ. of Vienna, Orthopaedic Bone & Joint Biomechanics Lab, Vienna, Austria; b Medical Univ. of Vienna, Institute for Biomedical Engineering and Physics, Vienna, Austria

11:45-12:00  Pectoralis major tendon transfer in subscapularis deficient shoulders: A biomechanical analysis #4911
Gerhard Konrad a, Peter Kreuz a, Norbert Suedkamp a, John Jolly b, Patrick McMahon b, Richard Debski b; a Dept. of Orthopaedic and Trauma Surgery, Univ. of Freiburg, Freiburg, Germany; b Musculoskeletal Research Center, Dept. of Bioengineering, Univ. of Pittsburgh, Pittsburgh, USA

12:00-12:15  Shape memory alloy staple for correction in adolescent idiopathic scoliosis #6342
Kauthar Saidane a, Carl-Eric Aubin b, c, a Dept. of Mechanical Engineering, Ecole Polytechnique, Montreal, Canada; b Biomechanical Modeling and Computer Assisted Surgery Lab, research Center, Sainte-Justine Hospital, Montreal, Canada

12:15-12:30  Evaluation of carpal tunnel mechanics using a three-dimensional computerized model #7131
Jeremy P.M. Mogk, Peter J. Keir; School of Kinesiology & Health Science, York Univ., Toronto, Canada

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.2.2 Falls
Session Organizer/Chair: Jaap van Dieën  
Wednesday, August. 2  
Room R1.046

11:00-11:15  Choice stepping response and transfer times: Effects of age, falls risk and secondary tasks #6353  
Stephen Lord\textsuperscript{a}, Rebecca St George\textsuperscript{a}, Richard Fitzpatrick\textsuperscript{a}, Mark Rogers\textsuperscript{b}; \textsuperscript{a}Prince of Wales Medical Research Institute, Univ. of New South Wales, Sydney, NSW, Australia; \textsuperscript{b}Dept. of Physical Therapy and Human Movement Sciences, Northwestern Univ., Chicago, IL, USA

11:15-11:30  Thresholds for inducing protective stepping to force-controlled perturbations in young and old adults #6208  
Daina Sturnieks, Stephen Lord, Richard Fitzpatrick; Falls and Balance Research Group, Prince of Wales Medical Research Institute, Sydney, Australia

11:30-11:45  New interventions to promote more effective change-in-support balance reactions #4656  
Brian Mak\textsuperscript{ab}, Kenneth Cheng\textsuperscript{a}, Philippe Corbeil\textsuperscript{d}, Geoff Fernie\textsuperscript{ab}, Tracy Lee\textsuperscript{a}, Barbara Liu\textsuperscript{a}, Avril Mansfield\textsuperscript{a}, Aaron Marquis\textsuperscript{a}, William McIlroy\textsuperscript{ab}, Stephen Perry\textsuperscript{cd}, Amy Peters\textsuperscript{a}, Carol Scovil\textsuperscript{a}; \textsuperscript{a}Sunnybrook and Women’s, Univ. of Toronto, Canada; \textsuperscript{b}Toronto Rehabilitation Institute, Toronto, Canada; \textsuperscript{c}Laval Univ., Quebec, Canada; \textsuperscript{d}Wilfrid Laurier Univ., Waterloo, Canada

11:45-12:00  The relation between hip impact velocity and hip impact force differs between sideways fall techniques #6366  
Brenda E. Groen\textsuperscript{a}, Vivian Weerdesteyn\textsuperscript{ab}, Jacques Duysens\textsuperscript{ab}; \textsuperscript{a}Sint Maartenskliniek Research, Development & Education, Nijmegen, The Netherlands; \textsuperscript{b}Dept. of Rehabilitation Medicine, Radboud Univ. Nijmegen Medical Centre, Nijmegen, The Netherlands

12:00-12:15  Gait and obstacle crossing behaviors of older adults during five months of Tai Chi training #6338  
Elizabeth T. Hsiao-Wecksler\textsuperscript{a}, John Jang\textsuperscript{a}, Arun K. Ramachandran\textsuperscript{a}, Yang Yang\textsuperscript{b}, and Karl S. Rosengren\textsuperscript{b}; \textsuperscript{a}Dept. of Mechanical and Industrial Engineering \textsuperscript{b}Dept. of Kinesiology Univ. of Illinois at Urbana-Champaign, Urbana, Illinois, USA

12:15-12:30  Martial arts fall techniques reduce hip impact forces in naive subjects after a brief period of training #6104  
Vivian Weerdesteyn\textsuperscript{a}, Brenda E. Groen\textsuperscript{a}, Wim van Lankveld\textsuperscript{a}, and Jacques Duysens\textsuperscript{ab} \textsuperscript{a}Sint Maartenskliniek Research, Development & Education, Nijmegen \textsuperscript{b}Dept. of Rehabilitation Medicine, Radboud Univ. Nijmegen Medical Centre, The Netherlands

3.  Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.4.2 Spine Mechanics
Session Organizers: Tom Oxland, V. J. Goel
Wednesday, August. 2
Room R0.006

11:00-11:15  Uncoforaminotomy destabilises cervical spine specimens #6192  
\textsuperscript{a}Kettler A, \textsuperscript{b}Schmieder K, \textsuperscript{b}Breke C, \textsuperscript{b}Pechlivanis I, \textsuperscript{b}Harders A, \textsuperscript{a}Claes L, \textsuperscript{a}Wilke HJ \textsuperscript{a}Institute for Orthopaedic Research and Biomechanics, Univ. of Ulm, Germany; \textsuperscript{b}Dept. of Neurosurgery, Ruhr-Univ. Bochum, Bochum

11:15-11:30  Load distribution between spinal active-passive systems in squat and stoop dynamic lifts #4830  
B. Bazrgari, A. Shirazi-Adl, N. Arjmand; Dept. of Mechanical Engineering, École Polytechnique, Montréal, Québec, Canada

11:30-11:45  Compressive load-sharing in the cervical spine #7437  
Daniel Skrzypiec, Phil Pollintine, Andrzej Przybyla, Trish Dolan, Mike Adams Dept. of Anatomy, Univ. of Bristol, Bristol, U.K.

Page 118 / 214
12:00-12:15  The Architectural Design Of The Lumbar Multifidus Muscle Supports Its Role As Stabilizer #5167
Samuel R. Ward, Carolyn M. Eng, Lionel J. Gottschalk, Choll W. Kim, Steven R. Garfin, Richard L. Lieber; Dept. of Orthopaedics, Univ. of California and VA San Diego Healthcare System, San Diego, CA, USA

12:15-12:30

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.5.2 Walking Dynamics
Session Organizers: Dieter Rosenbaum, Fabio Catani
Chairs: Dieter Rosenbaum
Wednesday, August 2
Room R1.006

11:00-11:15  Comparison of muscle activity and kinematics during treadmill walking with and without manual assistance in individuals with incomplete spinal cord injury #6508
Antoinette Domingo *, Gregory S. Sawicki *, and Daniel P. Ferris *, c, d
*aMovement Science, *Mechanical Engineering, *Biomedical Engineering, and dPhysical Medicine and Rehabilitation, Univ. of Michigan, Ann Arbor, MI, USA

11:15-11:30  Evaluation of the joint moment of lumber and lower extremity as the weight of sided load in walking #7303
Sungjae Hwang *, Hyunho Choi ?, Seoungkwan Cho ?, Huseok Choi *, Hansung Kim *, and Youngho Kim *, b
*bDept. of Biomedical Engineering, Yonsei Univ., Wonju, South Korea; bResearch Institute for Medical Instrumentation and Rehabilitation Engineering, Yonsei Univ., Wonju, South Korea

11:30-11:45  Diabetic Neuropathy And Orthopedic Foot Alteration: Which Is The Most Influencing Factor In Peak Plantar Pressure? #5930
Isabel CN Sacco, Tatiana A Bacarin, Paula MH Akashi; Lab. Biomechanics of Human Movement and Posture, Physical Therapy, Speech and Occupational Therapy, Dept., School of Medicine, Univ. of São Paulo, São Paulo, Brazil

11:45-12:00  Orbital Stability of Overground vs. Treadmill Walking #6072
Hyun Gu Kang *, Jonathan B. Dingwell; Dept. of Kinesiology, Univ. of Texas, Austin, Texas, USA

12:00-12:15  Automated moving fluoroscope: A novel method to acquire video fluoroscopic data during level walking #6086
Mauro Foresti, Hans Gerber, Edgar Stuessi; Laboratory for Biomechanics, D-MAVT, ETH Zurich, Zurich, Switzerland

12:15-12:30  Mechanics and control of a knee ankle foot orthosis (KAFO) powered with artificial pneumatic muscles #6102
Gregory S. Sawicki *, b, Daniel P. Ferris *, c, d, aMovement Science, *Mechanical Engineering, *Biomedical Engineering, and dPhysical Medicine and Rehabilitation, Univ. of Michigan, Ann Arbor, MI, USA

4. Implants for Trauma and Orthopedics-Joint ESB Track
4.4.1 Spinal Implants - Motion Preserving Implants
Chairs: Antonius Rohllmann, Hans-Joachim Wilke
Wed. Aug. 2.
Room E1.03

11:00-11:30  Biomechanical behavior of different Non-fusion Implants. Can we restore normal Biomechanics? #5810
Dept. of Orthopaedic Research and Biomechanics, Univ. of Ulm, Ulm, Germany

11:30-11:45  Effect of a posterior dynamic implant on the mechanical behavior of the lumbar spine #4321
Antonius Rohlmann *, Thomas Zander, Nagananda K. Burra, Georg Bergmann
Biomechanics Laboratory, Charité Campus Benjamin Franklin, Berlin, Germany
11:45-12:00 Artificial disc position influences forces and intersegmental rotations in the lumbar spine #4959
Thomas Zander, Antonius Rohlmann, Benjamin Bock, Georg Bergmann
Biomechanics Laboratory, Charité Campus Benjamin Franklin, Berlin, Germany

12:00-12:15 Biomechanical comparison of 4 different distractable cages for the thoracolumbar Spine – an in-vitro study #4244
Werner Schmoelz, Fabiano Canto, Max Reinhold, Dietmar Krappinger, Michael Blauth, Christian Knop; Dept. of Trauma Surgery and Sports Medicine, Medical Univ. Innsbruck, Austria

5. Occupational and Impact Injury Biomechanics
5.5.1 Thorax Injury Biomechanics
Session Organizer /Chair: Richard Kent
Wednesday, August 2
Room R0.058
11:00-11:15 Enhanced method and tools for child thoracic and abdominal compliance assessment by clinical treatments observation #5044
François Bemond a, Jacques Bergea b, François Alonzo a, Clément Goubela c, Karine Bruyère a, Patrick Joffrina d, Bernard Cossalter a, Jean-Pierre Verriest a
a INRETS – LBM, Bron, France; b Université Joseph Fourier Grenoble 1, Ecole de Kinésithérapie du Centre Hospitalier; Université de Grenoble, Echirolles, France; c Now at LIER S.A., Lyon Saint Exupéry Aéroport, France

11:15-11:30 Biomechanical model of human thorax #5574
Lenka Číhalová; Dept. of mechanics, Faculty of Applied Sciences, Univ. of West Bohemia, Plzeň, Czech Republic

11:30-11:45 Material and Structure Characterization of Human Ribs #6593
Estelle Charpail a, b, Sébastien Laporte c, Xavier Trosseille c, Guy Valancien c, François Lavaste d; a LBM, ENSAM, Paris, France; b LAB, GIE Renault PSA Peugeot-Citroën, Nanterre, France; c Université René Descartes, Paris, France

11:45-12:00 Mechanical properties of structural tissues of the pediatric thorax #7139
Michelle L. Oyen, Anthony G. Lau, Matthew W. Kindig, Stephen C. Stacey, Richard W. Kent Center for Applied Biomechanics, Univ. of Virginia, Charlottesville, VA, USA

12:00-12:15 The influence of the HIII 5th jacket displacement on measured chest deflection #7687
Suzanne Tykho a, Alain Bussieres b, c; a Crashworthiness Division, Transport Canada, Ottawa, Canada; b PMG Technologies, Blainville, Quebec, Canada

12:15-12:30 Methodology for Evaluation of Impact Injury Criteria using Real Crash Injury Outcomes and Event Data Recorders #6014
Douglas J. Gabauer a, b, H. Clay Gabler a, and Robert Thomson b; a Virginia Tech School of Biomedical Engineering and Sciences, Blacksburg, Virginia USA; b Division of Vehicle Safety, Chalmers Univ. of Technology, Gothenburg, Sweden

6. Sport Biomechanics-Joint ISB Track
6.3.2 Footwear-Movement Control
Session Organizers /Chairs: Joe Hamil, Darren Stefanshyn
Wednesday, August 2
Room D2.12
11:00-11:30 Development of e-Phantoms of Human Foot Based on 3D Finite Element Models for Foot Biomechanics and Support Designs #7196
Ming Zhang a, Jason Tak-Man Cheung a, Jia Yu a, Aaron Kam-Lun Leung a, Yubo Fan a, b; a Dept. of Health Technology and Informatics, The Hong Kong Polytechnic Univ., Hong Kong; b Dept. of Bioengineering, Beihang Univ., China

11:30-11:45 Foot joints and tibial kinematic coupling patterns during stance phase of barefoot versus shod running #4508
9. Tissue Engineering

9.1.5 Substrate/Biomaterial (Mesoscale)

Session Organizers: Christian Oddou, Alicia El Haj
Chairs: A. J. El Haj, P. Swider

Wednesday, August 2
Room 1.004

11:00-11:30 Modelling in cellular biology and poroelasticity might help to predict mechanobiological phenomena in bone formation #5404
Pascal Swider, Dominique Ambard; Biomechanics Laboratory EA 3697, Toulouse, France

11:30-11:45 A multi-phase model for the growth of a bone tissue construct subject to dynamic culture conditions #6610
O'Dea, R., Waters, S.L., Byrne, H.M., El-Haj, A.; Division of Applied Mathematics, Univ. of Nottingham, UK; Institute of Science & Technology in Medicine, Keele Univ.

11:45-12:00 In vitro bone regeneration and micro-mechanical strain in mechano-active scaffolds #6934
E. Baas, J.H. Kuiper, Y. Yang, A. Wood and A.J. El Haj; Institute of Science and Technology in Medicine, Keele Univ., Stoke-on-Trent, UK

12:00-12:15 Assessment of a novel hydroxyapatite bone tissue engineering scaffold incorporating a tri-modal pore distribution #6563
C.T. Buckley, K.U. O'Kelly; Trinity Centre for Bioengineering, Trinity College Dublin, Ireland

12:15-12:30 Modeling of large bone implant culture in a perfusion bioreactor #7401
J. Pierre, B. David, K. Oudina, H. Petite, C. Ribreau, C. Oddou; B2OA, Faculté des Sciences, Université Paris 12, Créteil, France; B2OA, Université Paris 7, UMR CNRS 7052, Paris, France

10. Cellular and Molecular Mechanics

10.4.2 Cytoskeletal, Nuclear, and Membrane Rheology

Session Organizers /Chairs: Dennis E. Discher, Andreas Bausch

Wednesday, August 2
Room R0.056
11:00-11:15 Optical Cell Rheology: Identifying the Microscopic Origins of Cells’ Elasticity in Suspension #7033
Falk Wottawah, Stefan Schinkinger, Bryan Lincoln, Maren Romyke, Revathi Ananthikrishnan, Jochen Guck, Josef Käs; Univ. of Leipzig, Fakultät für Physik und Geowissenschaften, Leipzig, Germany

11:15-11:30 Nonlinear mechanical properties of entangled and crosslinked actin networks #7167
Christine Semunich, Rainer Tharmann, Bernd Wagner, Andreas R. Bausch Lehrstuhl für Biophysik E22, Physik-Dept., Technische Universität München, Garching, Germany

11:30-11:45 Hierarchical Structural Organization controls Elasticity in model F-Actin Networks #819
Claus Heussinger, Erwin Frey; Ludwig-Maximilians-Universitataet Muenchen, Munich, Germany

11:45-12:00 Rheology and Network Architecture of Neurofilament Gels #7223
S. Rammensee, P. A. Janmey, A. R. Bausch; E22-Biophysics, Technische Universität München, Garching, Germany, Institute for Medicine and Engineering, Univ. of Pennsylvania, Philadelphia, USA

12:00-12:15 Withdrawn
12:15-12:30 The consensus mechanical response of cells and the role of dynamic protein cross-links #7491
John C. Crockera,b, Gladys Massiera and Brenton D. Hoffman; aDept. of Chemical and Biochemical Engineering, bInstitute for Medicine and Engineering; Univ. of Pennsylvania, Philadelphia, PA, USA

11. Artificial Organs
11.1.2 Clinical Aspects of Hemodialysis
Session Organizers /Chairs: Jorg Vienken, Michel Jaffrin
Wednesday, August 2
Room R1002

11:00-11:30 Are there optimal dialysis strategies for the management of uremic toxicity? #7847
Wim van Biesen and Raymond Vanholder; Univ. of Ghent, Dept. of Nephrology, Ghent, Belgium

11:30-11:45 Do different haemodialysis regimen interfere with genomic damage in patients with end-stage-renal disease? #7399
Jörg Vienkena, Nicole Schupp, Kristin Kobras, Udo Bahner, Helga Stopper and August Heidland; Fresenius Medical Care, Biosciences Dept., Bad Homburg, Germany; Toxicology Dept., Univ. of Würzburg, Germany; KFH Würzburg Dialysis Center, Würzburg, Germany

11:45-12:00 Effects Of Profiler-Hd On Dialysis Tolerance: Results Of A Multicentric Italian Study #7314
Nephrology, Dialysis and Renal Transplantation Unit, S.Orsola Univ. Hospital, Bologna, Italy; Bellco, Mirandola, Italy; Nephrology and Dialysis Units of Lecco, Ravenna, Torino, Piacenza, S.Giovanni Rotondo, Mantova, Roma, Italy

12:00-12:15 PIV and CFD assessment of flow and shear stress distribution in central vein hemodialysis catheters #6606
Guy Mareels, Radoslav Kaminsky, Pascal R. Verdone; Cardiovascular Mechanics and Biofluid Dynamics research unit, Institute Biomedical Technology, Gent Univ., Belgium; ILA GmbH, Julich, Germany

12. Biomaterials
Track Coordinators: Yannis Misirlis, Birgit Glasmacher
12.1.1 Biomaterials for Therapeutic Delivery
Session Organizers /Chair: Yannis Misirlis, Hasan Uludag
Room R1.001

11:00-11:30 Three-dimensional scaffolds in tissue engineering #6535
Jeffrey A. Hubbell, Tatiana Segura, M. Mikael Martino, Peter Frey, Thomas H. Barker
11:30-12:00  
Stimuli-sensitive implant materials #5647
Andreas Lendlein; Institute of Polymer Research, GKSS Research Centre Geesthacht GmbH, Teltow, Germany

12:00-12:15  
Cell-surface interactions between rat Schwann cells and a biomimetic surface prepared by plasma activation and subsequent vapor grafting process #4937
Yun-Ta Yang, Jiunn-Der Liao; Dept. of Materials Science and Engineering, National Cheng Kung Univ., Tainan, Taiwan (ROC)

12:15-12:30  
Electro-mechanical Characterisation of Chitosan membrane for assistance in drug delivery #5295
Sheba Rani N.D., Subrata Pal; School of Bioscience & Engg., Jadavpur Univ., Kolkata, India

13. Respiratory Mechanics

13.6.1 Transport in the Upper Airways

Session Organizers: Dennis Doorly, Tilman Keck

Wednesday, Aug. 3
Room R2.088

11:00-11:15  
Keynote: Nasal airflow: computational and experimental modeling #6753
D J Doorly a, V Franke a,b, A Gambaruto a, D J Taylor a,b and R C Schroter b
a Dept. of Aeronautics, b Dept. of Bioengineering, Imperial College London, UK

11:30-11:45  
Wall shear stresses in the normal and septal-deviated nose #6252
David Elad a, Sara Naftali a, Moshe Rosenfeld b, Michael Wolf b
Depts. of aBiomedical Engineering and bFluid Mechanics, Tel Aviv Univ., Israel

11:45-12:00  
Life Beyond the Air Phase: Adding Tissue Disposition to Models of Nasal Airway Transport #7335
J.S. Kimbell, J.D. Schroeter, D.C. Dorman, and M.E. Andersen; CIIT Centers for Health Research, Research Triangle Park, NC, USA

12:00-12:15  
Impact of the Geometry on the Nose Flow #5624
Ingolf Hörschler, Wolfgang Schröder; Aerodynamisches Institut, RWTH Aachen, Germany

12:15-12:30  
Computational modelling of nasal aerodynamics #7738
Marit Kleven a, Morten C. Melaaen b, Martin Reimers a, Per G. Djupesland c
a Telemark Univ. College and Telemark R&D Centre (Tel-Tek), Porsgrunn, Norway; b CMA, Univ. of Oslo, Oslo, Norway; c OptiNose AS, Oslo, Norway

14. Cardiovascular Mechanics

14.5.3. Atherosclerosis and Aneurysms 2

Session Organizers /Chairs: Charles A. Taylor, Francesco Migliavacca

Wednesday, August. 2
Room G1.27

11:00-11:15  
Numerical simulation of blood flow in the circle of Willis with outflow boundary conditions using a one-dimensional model #7417
Marie Oshima a, Shigefumi Tokuda a, Takeshi Unemura b and Satoshi Sugiyama a
a Institute of Industrial Science, Univ. of Tokyo, Tokyo, Japan; b AdanceSoft Corporation, Tokyo, Japan

11:15-11:30  
Statistical and numerical investigations of cerebral aneurysms' morphology and haemodynamics #6407
A. Veneziani a, E. Boccardi a, L. Antiga a, M. Piccinelli a,b, P. Secchii a, S. Vantini d, T. Passerini a, M. De Luca a, S. Baccigaluppi b; a, b MOX, Dept. Of Mathematics, Politecnico di Milano, Italy; b Univ. of Milan, Neurosurgery, Ospedale Maggiore Policlinico - Fondazione IRCCS, Milano, Italy; d Azienda Ospedaliera Ospedale Niguarda Ca' Granda, Milano, Italy

11:30-11:45  
Three-dimensional Simulations of Hemodynamic Factors in Pulmonary Hypertension #6625
14. Cardiovascular Mechanics

14.6.2 Computational Modelling

Session Organizer /Chair: David Steinmann

(Incorporating presentations from Thread 1 Computational Methods in Biomechanics and Mechanobiology
Thread organizers: Gerhard A. Holzapfel, Tim David)

Wednesday, August 2

Room R1.007

11:00-11:30 Keynote: Patient-specific pulmonary hemodynamic simulations linking lumped-parameter boundary conditions to morphometric data #7465
Ryan L. Spilker a, Irene E. Vignon-Clementel a, Hyun Jin Kim a, Jeffrey A. Feinstein b, Charles A. Taylor a, c, d; a Dept. of Mechanical Engineering, Stanford Univ., Stanford, CA, USA; b Dept. of Pediatrics, Stanford Univ., Stanford, CA, USA; c Depts. of Bioengineering and Surgery, Stanford Univ., Stanford, CA, USA

11:30-11:45 Coupling a Bond Graph Model of the Left Ventricle with a CFX Model of the Aorta: A First Approach #4794
V. Diaz-Zuccarini, D.R. Hose, P.V. Lawford; Medical Physics Dept., Univ. of Sheffield, Royal Hallamshire Hospital, Sheffield, United Kingdom.

11:45-12:00 Numerical Flow Simulation in the Human Heart #6230
M.Reik, M.Malvè, H.Oertel; Institute for Fluid Mechanics, Univ. Karlsruhe, Germany

12:00-12:15 Computational and Experimental Analysis of Flow in Lymphatic Vessels #5878
Alison Macdonald a, Gavin Tabor a, Peter Winlove b, Kenton Arkill b, Noel McHale c
Schools of a Engineering and b Physics, Univ. of Exeter, Exeter UK, EX4 4QL
c Dundalk Institute of Technology, Exeter, UK

12:15-12:30 Capillary Filtration May Explain the Delayed Onset of Presyncope in Astronauts During Postflight Stand Tests #6687
Justin Broskey, M. Keith Sharp; Biofluid Mechanics Laboratory, Dept. of Mechanical Engineering, Univ. of Louisville, KY, USA

14. Cardiovascular Mechanics

14.7.2 Coronary Circulation

Chairss: Shmuel Einav, Juichiro Shimuzu

Wednesday, August 2

Room G2.36

11:00-11:30 Keynote: Implications of 3D Vascular Geometry #4249
C. Caro, N. Cheshire, D. Ellis, M. Cerini and S. Cremers; Imperial College London, UK

11:30-11:45 Asynchronous Stretch And Shear Affect Endothelial Phenotype In The Coronary Arteries #4202
Michael Dancu, John M. Tarbell; Dept. Of Biomedical Engineering, The City College of New York, New York, NY, USA
11:45-12:00  Mathematical modelling of coronary artery blood flow #4845
SL Waters, JH Siggers; Division of Applied Mathematics, Univ. of Nottingham, Univ. Park, Nottingham, UK

12:00-12:15  Unstructured Cartesian Sharp-Interface Computational Method for Flow Simulations in Realistic Cardiovascular Anatomies #5860
Diane de Zelicourt,¹ Chang Wang,¹ Fotis Sotiropoulos,² and Ajit Yoganathan¹; ¹Wallace H. Coulter Dept. of Biomedical Engineering, Georgia Institute of Technology and Emory Univ., Atlanta, GA; ²Saint Anthony Falls Laboratory, Univ. of Minnesota, Minneapolis, MN

12:15-12:30  Withdrawn

12:30-12:45  Coronary Wave Intensity in Humans: Effect of Changes in Microvascular Resistance and Hemodynamic Conditions #6953
Christina Kolyva, Jos A.E. Spaan, Bart-Jan Verhoeff, Jan J. Piek, Maria Siebes Academic Medical Center, Amsterdam, The Netherlands

12:45-13:00  In vivo detection of the vasa vasorum density in coronary atherosclerotic lesions using contrast enhanced intravascular ultrasound imaging with microbubbles #7693
S Carlier¹, M Vavuranakis ², S O’Malley³, I Kakadiaris¹, E. Falk⁴, C. Stefanadis¹, M. Naghavi⁷ Columbia Univ., New York, USA; ²Hippocration Hospital, Medical School, Athens, Greece; ³Texas Learning and Computation Center, Houston, USA; ⁴Skejby Sygehus, Aarhus, Denmark; ⁷American Heart Technologies, Inc., Houston, USA

14. Cardiovascular Mechanics
14.11.2 Mechanobiology of Vascular Walls and Cells
Session Organizers /Chairs: Masaaki Sato, Mort Friedman
Wednesday, August. 2
Room G0.01

11:00-11:30  Harmonic environment and frequency response of vascular cells. Toward a definition of disturbed flow #7885
Morton H. Friedman; Dept. of Biomedical Engineering, Duke Univ., Durham NC, USA

11:30-11:45  Endothelial cell adhesion molecule (CAM) expression following exposure to physiological coronary WSS #4774
L. O’Keeffe⁵, E. Gibney⁶, G. Muir⁵, B. McCormack⁶, J. Bird⁶, R. Nerem⁵, T. McGloughlin⁵
⁵CABER, Univ. of Limerick, Limerick, Ireland; ⁶Sligo Institute of Technology, Sligo, Ireland, ⁵GTEC, Georgia Institute of Technology, Atlanta, USA

11:45-12:00  Withdrawn

12:00-12:15  Endothelial Microheterogeneity: A Novel Mechanism of Signal Modulation in the Microvasculature? #5870
Kenneth A. Barbee,⁶ Dihui Hong,⁶ Donald G. Buerk,⁵ and Dov Jaron⁷
⁶School of Biomedical Engineering, Science and Health Systems, Drexel Univ.; ⁵Depts. of Physiology and Bioengineering, Univ. of Pennsylvania, Philadelphia, USA

11:45-12:00  Withdrawn

12:00-12:15  Increased axial loading and altered hemodynamic conditions stimulate components of the NF-kB pathway, MMP expression, and remodeling in cultured porcine carotid arteries #6090
Jason W. Nichol¹² and Keith J. Gooch¹³; ¹²HST Division, MIT, Cambridge, MA, USA
¹³Dept. of Bioengineering and Institute for Medicine and Engineering, Penn, Philadelphia, PA, USA; ³Dept. of Biomedical Engineering, Ohio State Univ., Columbus, OH, USA

15. Microcirculation
15.3.2 Flow in Microchannels and Microvessel Networks: Flexible Particles (Cells, Vesicles) and Cell-Vascular Wall Interactions
Session Organizers /Chairs: D. Barthès-Biesel, S. Weinbaum
Wednesday, August. 2
Room R1.005
11:00-11:30 Flow of bioartificial capsules in microchannels #4340
Dominique Barthès-Biesel, Eric Leclerc, Yannick Lefèbvre, Johann Walter
CNRS UMR 6600, Laboratoire de Biomécanique et Génie Biomédical, Université de Technologie de Compiègne, France

11:30-11:45 Computational modeling of bubble transport through bifurcations in the microcirculation #6016
Brijesh Eshpunyani, Andres J. Calderon, Joseph L. Bull; Dept. of Biomedical Engineering, Univ. of Michigan, Ann Arbor, MI, USA

11:45-12:00 Bubble splitting and lodging in multiple arteriole bifurcations under pulsatile flow conditions #6019
Joseph L. Bull a, Brijesh Eshpunyani a, Brian J. Fowlkes b; a Dept. of Biomedical Engineering, b Dept. of Radiology, Univ. of Michigan, Ann Arbor, MI, USA

12:00-12:15 Numerical simulation of 3-D deformation of a neutrophil in a rectangular microchannel #6860
Atsushi Shirai a, Sunao Masuda b, Toshiyuki Hayase a; a Institute of Fluid Science, Tohoku Univ., Sendai, Japan; b Graduate School of Engineering, Tohoku Univ., Sendai, Japan

12:15-12:30 Integrated models of signal transduction and adhesion describe neutrophil firm adhesion under flow #7783
Daniel A. Hammer a,b, Kelly Caputo a, and Ellen Krasik b; a Dept. of Chemical and Biomolecular Engineering, Univ. of Pennsylvania, Philadelphia, PA, USA; b Dept. of Bioengineering, Univ. of Pennsylvania, Philadelphia, PA, USA

17. Biomechanics in Nature
17.5.1 Terrestrial Locomotion
Session Organizers: Andy Biewener, Alan Wilson
Wednesday, August 2
Room R1.087

11:00-11:15 Is there a proximo-distal gradient of limb muscle function? #6144
A. Biewener a, E. Yoo a and M. P. McGuigan b
FS, Harvard Univ., Bedford, MA, USA; a Sport and Exercise Science, Univ. of Bath, UK

11:15-11:30 Linking muscle-tendon dynamics to limb control and running stability #6155
Monica A. Daley a and Andrew A. Biewener; a Concord Field Station, Harvard Univ., Cambridge MA, USA

11:30-11:45 Biomechanics of muscle synergies underlying postural control #6173
Lena H. Ting; Laboratory for Neuroengineering, W.H. Coulter Dept. of Biomedical Engineering, Emory Univ. and Georgia Institute of Technology, Atlanta, GA USA

11:45-12:00 Mechanics of over-ground locomotion in the dromedary camel (Camelus Dromedarius) #6922
Thilo Pfau a, Kevin Parsons a, Alan Wilson b, c; a Structure and Motion Lab, The Royal Veterinary College, Univ. of London, UK; b Structure and Motion Lab, Univ. College London, The Royal National Orthopaedic Hospital, Brockley Hill, Stanmore, Middx, UK

12:00-12:15 Passive-dynamic locomotion #7063
Andy Ruina; Theoretical and Applied Mechanics, Cornell Univ., Ithaca, NY, USA

12:15-12:30 Dynamic Bipedal Locomotion on Compliant Legs #7581
Shawn M. O’Connor a, Arthur D. Kuo a,b; Depts. of a Biomedical Engineering and b Mechanical Engineering, Univ. of Michigan, USA

18. Trends in Cranial and Spinal Biomechanics
18.1.3 Flow in cerebral aneurysms
Session Organizers /Chairs: B. Lieber, Hiroshi Ujiie
Wednesday, August 2
Room R2.091

11:00-11:15 Fluid-structure interaction finite element analysis of middle cerebral artery aneurysm #6187
Hiroshi Fukunari, Marie Oshima, Ryo Torii, Hiroshi Watanabe and Toshiaki Hisada

Institute of Industrial Science, The Univ. of Tokyo, Tokyo, Japan;  
Dept. of Chemical Engineering, Imperial College London, London, UK;  
Graduate School of Frontier Sciences, The Univ. of Tokyo, Japan

11:15-11:30 Biomechanical study of structural changes of human cerebral arteries #6254
E. Fonck, G. Feigl, L. Augsburger, D. Rüfenacht, N. Stergiopoulos;  
Laboratory of Hemodynamics and Cardiovascular Technology, Swiss Federal Institute of Technology at Lausanne;  
Neuroradiology Dept., Geneva Univ. Hospital, Switzerland

11:30-11:45 Wall motion and hemodynamics of intracranial aneurysms # 6398
Laura Dempere-Marco, Estanislao Oubel, Alejandro Frangi, Christopher M. Putman,  
Marcelo A. Castro, Juan R. Cebal;  
Interventional Neuroradiology, Inova Fairfax Hospital, Virginia, USA;  
School of Computational Sciences, George Mason Univ., Virginia, USA

11:45-12:00 Withdrawn

12:00-12:15 Particle image velocimetry of flow dynamics in anatomically realistic basilar tip aneurysms #6619
Matthew D. Ford, Hristo N. Nikolov, Edwin DeMont, David W. Holdsworth, David A. Steinman;  
Imaging Research Laboratories, Robarts Research Institute, London, Canada;  
Dept. of Medical Biophysics, The Univ. of Western Ontario, London, Canada;  
Dept. of Biology, Saint Francis Xavier Univ., Antigonish, Canada;  
Dept. of Mechanical & Industrial Engineering, Univ. of Toronto, Toronto, Canada

12:15-12:30 Effect of packing cerebral aneurysms with hydrogel-coated coils on the wall stresses #6865
Gádor Cantón, Christian Geindreau and Juan C. Lasheras;  
Dept. of Mechanical and Aerospace Engineering, Univ. of California, San Diego, California, USA;  
Laboratoire Sols Solides Structures (35), UJF, INPG, CNRS, Domaine Universitaire Grenoble, France

12:30-12:45 Changes of flow characteristics by Neuroform stents' placement in the patient-specific aneurysm models #5025
Yasuhiro Hakata, Tetsuya Tanoue, Kazuo Tanishita, Satoshi Tateshima;  
Dept. of System Design Engineering, Keio Univ., Kanagawa, Japan;  
Medical center, UCLA, Westwood, USA

19. Biotransport

19.4.1 Transport in Native and Engineered Cells and Tissues
Session Organizer /Chair: George Truskey
Wednesday, August 2
Room, R0.003

11:00-11:15 Electric field-mediated enhancement of in vivo transport of plasmid DNA in tumor interstitium #4083
Joshua W. Henshaw, David A. Zaharoff, Brian J. Mossop, Fan Yuan;  
Dept. of Biomedical Engineering, Duke Univ., Durham, NC, USA;  
Laboratory of Tumor Immunology and Biology, National Cancer Institute (NIH), Bethesda, MD, USA

11:15-11:30 A Time-Dependent Electrodiffusion-Convection Model for Charged Macromolecular Transport in the Interstitial Space #4384
Bin Chen, Bingmei M. Fu;  
Dept. of Mechanical Engineering, Univ. of Nevada, Las Vegas, Las Vegas, NV,U.S.A.;  
Dept. of Biomedical Engineering, The City Univ. of New York, New York, NY, U.S.A.

11:30-11:45 The importance of pressure in describing the forces on a cell in an extracellular matrix #4895
William McCarty, Mark Johnson;  
Dept. of Biomedical Engineering, Northwestern Univ., Evanston, IL, USA

11:45-12:00 Albumin Transport Across Human Endothelium Co-Cultured with Vascular Smooth Muscle Cells #6177
Olakunle Ogunrinade, Charles S. Wallace, and George A. Truskey;  
Dept. of Biomedical Engineering, Duke Univ., Durham, NC, USA

12:00-12:15 Drug dynamics in eluting stents: modelling, simulation and design #5678
Giuseppe Ponthelli, Filippo de Monte;  
IAC – CNR, Roma, Italy

bUniv. of L’Aquila, Roio Poggio (AQ), Italy
20. Biomechanics of Organs
20.5.1 Biomechanics of Skin
Session Organizer: Frank Baaijen
Wednesday, August 2
Room R1.008
11:00-11:15 A mechanism for epidermal differentiation, driven by calcium #4583
Dept. of Biomedical Technology, Univ. of Technology, Eindhoven, The Netherlands

11:15-11:30 An automatic procedure to map the skin strain field with application to advanced locomotion space suit design #5086
Nina Woldram, Dava J. Newman, Kristen Bethke, Dept. of Aeronautics and Astronautics and Engineering Systems, Massachusetts Institute of Technology, Cambridge, MA, USA; b Dept. of Biomedical Technology, Univ. of Technology, Eindhoven, The Netherlands

11:30-11:45 Nonlinear Tension Field Finite Element Analysis of Expanded Skin Flaps #7568
Suresh Shrivastava and Pamela Conner; Dept. of Civil Engineering and Applied Mechanics, McGill Univ., Montreal, Quebec, Canada

12:00-12:15 Analysis on Texture Perception of Geometry of Artificial Skin and Lubricant #5378
Yasuhisa Kamikawa, Hirokazu Shirado, Takashi Maeno; Maeno Lab, Keio Univ., Yokohama, Japan

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.7.2 Computational Biomechanics and Mechanobiology of Musculoskeletal Soft Tissues
Session Organizers /Chairs: Richard E. Debski, Jeffrey A. Weiss
Wednesday, August 2
Room G0.43
11:00-11:15 Evaluation of 3D Muscle Models using Cine DENSE Imaging #6085
S. S. Blenker, X. Zhong, B. S. Spottiswoode, P. A. Helms, F. H. Epstein; a Dept. of Mechanical & Aerospace Engineering, b Biomedical Engineering, and c Radiology, Univ. of Virginia, Charlottesville, VA, United States; d MRC/UCT Medical Imaging Research Unit, Univ. of Cape Town, Cape Town, South Africa

11:15-11:30 Mechanics of soft tissues at high strain rates #5891
G. Limbert and J. Middleton; a FIRST Numerics Ltd, Cardiff, UK
b Biomechanics Research Unit, School of Dentistry, Wales College of Medicine, Cardiff Univ., Cardiff, UK

11:30-11:45 MCL Mechanics in the ACL-deficient Knee. An Experimental and Finite Element Based Study #4912
Trevor J. Lujan, Benjamin J. Ellis, Brent M. Thompson, Jeffrey A. Weiss; a Dept. of Bioengineering and b Scientific Computing and Imaging Institute, Univ. of Utah, USA

11:45-12:00 Simulation of the TMJ complex under quasi-static and dynamic loads #6870
Manuel Doblaré, Amaya Perez-del Palomar; Group of Structural Mechanics and Materials Modelling (GEMM). Aragón Institute of Engineering Research (I3A), Univ. of Zaragoza, Spain

12:00-12:15 Discrete Versus Composite Modeling of the Glenohumeral Capsular Regions: Effect on Predicted Strain Distribution #4935
Susan M. Moore, Benjamin J. Ellis, Jeffrey A. Weiss, Patrick J. McMahon; a Univ. of Pittsburgh, b Dept. of Bioengineering, c Dept. of Orthopaedic Surgery, USA; d Univ. of Utah, Dept. of Biomechanical Engineering, USA

12:15-12:30 Numerical and Experimental Analyses of the Mechanical Response of Human Fingertip Pulp to Loading #4543
Thread 1: Computational Methods in Biomechanics and Mechanobiology

T1.14.3 Image-based anatomical modelling for CAD/FEA applications

Session Organizer /Chair: Panos Diamantopoulos

Wednesday, August 2

Room R2.007

11:00-11:15 Forearm Muscle Volumes Can Be Accurately Obtained From High Resolution MRI

Carolyn M. Eng, Samuel R. Ward, Laura H. Smallwood, Geoff D. Abrams, Richard L. Lieber
Dept. of Orthopaedics, Univ. of California and VA San Diego Healthcare System, San Diego, CA, USA

11:15-11:30 Evaluation of hip strength from radiographs

Timo Jämsä, Pasi Pullkinne; Dept. of Medical Technology, Univ. of Oulu, Oulu, Finland

11:30-11:45 A fast framework for modelling the effective orthotropic elastic properties of cancellous bone

a Institute of Lightweight Structures and Structural Biomechanics, TU-Vienna, Austria; b CAE Simulation & Solutions GmBH, Vienna, Austria

11:45-12:00 Mechanical properties of the patellar cartilage by an inverse FE approach from MR-monitored compression tests

Sven Knecht, Roger Luechinger, Edgar Stuessi; Laboratory for Biomechanics, ETH Zurich, Switzerland; Laboratory for Biomechanics ETH, Zurich, Switzerland

12:00-12:15 Comparison of performances in a bending test between a real volume and an ordinary cylindrical FE model of a single trabecula

Silvio Lorenzetti, Katja Oberhofer, Christoph Sprecher, Edgar Stüssi; Laboratory for Biomechanics, ETH Zurich, Switzerland; AO Research Institute, Davos, Switzerland

12:15-12:30 A simple logic based method for segregation of grey matter and white matter in 3D finite element human head model from CT Scan data

Shamik Sarkar, Ujjal Bhanu Ghosh, Dr. Amit Roychowdhury; Dept. of Applied Mechanics, Bengal Engineering and Science Univ., Shibpur, India; School of BioScience and Engineering, Jadavpur Univ., Kolkata, India

Thread 4: Imaging

T4.7.1 Quantitive Functional Imaging

Chair: Jess. G. Snedeker, Yi-Xian Qin

Wednesday, August 2

Room R1.003

11:00-11:15 Tracking molecules in stressed cells: multimodal microscopy and single molecule spectroscopy for mechanotransduction

Peter J. Butler, Ramachandra Gullapalli, Tristan Tabouillot; Cell and Tissue MechanoTransduction Lab; The Pennsylvania State Univ.; Dept. of Bioengineering; Univ. Park, PA, USA


JG Snedeker, G Pelled, Y Zilberman, R Müller, D Gazi; Institute for Biomedical Engineering, Univ. and ETH Zurich, Switzerland; b Skeletal Biotechnology Laboratory, Hebrew Univ.–Hadassah Medical Center, Jerusalem, Israel

11:30-11:45 Trabecular Bone Density and Strength Assessment Using Non-Invasive Scanning Confocal Ultrasound Imaging

Yi-Xian Qin, Yi Xia, Wei Lin, Erik Mittra, Barry Gruber, Clint Rubin; Dept. of Biomedical Engineering, State Univ. of New York at Stony Brook, Stony Brook, NY, USA

11:45-12:00 Prediction of the mechanical properties of normal and degenerated articular cartilage and trabecular bone using MRI

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Thread 5 Electro-Impedance
Thread Organizer: Tadeusz Palko
Wednesday, August 2
Room R0.005

11:00-11:15 Impedance cardiography vs clamp plethysmography of Penaz in diagnostic of patients with vasovagal syncope #7392
Kazimierz Peczalski a, Dariusz Wojciechowski a, Piotr Sionek a, Zbigniew Dunajski b, Tadeusz Palko b; aIBIB PAN Warsaw, bWarsaw Univ. of Technology, Warsaw, Poland

11:15-11:30 Impedance methods for study of systemic pulmonary circulation #7095
Tadeusz Palko; Warsaw Univ. of Technology, Institute of Precision and Biomedical Engineering, Warsaw, Poland.

11:30-11:45 Impedance cardiography used for comparison of haemodynamic effect of pressotherapy in patients and controls #6553
Szwast M. a, Palko T. a, Pszenny C. b, Darowski M. c, Palko K.J. d; aWarsaw Univ. of Technology, bSpecialist Medical Practice, cPolish Academy of Science, Warsaw, Poland

11:45-12:00 Impedance and plethysmographic measurements for optimization of pacing parameters #7451
Kazimierz Peczalski a, Dariusz Wojciechowski a, Piotr Sionek a, Zbigniew Dunajski b, Tadeusz Palko b; aIBIB PAN Warsaw, Poland; bWarsaw Univ. of Technology, Warsaw, Poland

12:00-12:15 Estimation of heart muscle contractility by means of ICG and ECG #6741
Jerzy Wtorek, Adam Bujnowski, Andrzej Maczynski; Biomedical Engineering Dept., Gdansk Univ. of Technology, Gdansk, Poland

12:15-12:30 An EIMG – EMG measurement system # 6738
Jerzy Wtorek, Adam Bujnowski, Andrzej Maczynski; Biomedical Engineering Dept., Gdansk Univ. of Technology, Gdansk, Poland

The World Council Meeting
13:00-16:00
Senate Saal-Fachhochschule Munich A Building
Wednesday, Aug. 2
14:00-15:30

2 Musculoskeletal Mechanics-Joint ISB Track
2.4 Muscle Energetic (Muscle Energetics in locomotion)
Session Organizer: Alberto E. Minetti

Wednesday, August. 2
Room R1.049

14:00-14:15 Energetics of Producing Muscle Force for Short Durations #7582
Jiro Doke, Arthur D. Kuo; Dept. of Mechanical Engineering, Univ. of Michigan, USA

14:15-14:30 Linking Limb Length to Locomotor Cost in Terrestrial Animals #6490
Herman Pontzer; Dept. of Anthropology, Harvard Univ., Cambridge, USA

14:30-14:45 Withdrawn

14:45-15:00 A muscle-driving model of human walking and estimate of metabolic expenditure on muscles #4993
Weijie Wanga, Robin Cromptonb, Alberto Minettic, Michael Guntherd, William Sellersd, Rami Abboudc, RMcN Alexanderf; 1Institute of Motion Analysis and Research, Univ. of Dundee, Dundee, UK; 1Dept. of Human Anatomy and Cell Biology, Univ. of Liverpool, Liverpool, UK; 1Institute of Human Physiology I, Univ. of Milan, Milano, Italy; 4Dept. of Anatomy, Univ. of Manchester, Manchester, UK; 1Dept. of Biology, Univ. of Leeds, Leeds, UK

15:00-15:15 Skeletal Muscle Energetics: Insight From Heat Production And Metabolic Energy Turnover Measurements #7192
José González-Alonso, Centre for Sports Medicine and Human Performance. Brunel Univ., Uxbridge, UK

15:15-15:30 Heavily loaded walking on steep paths in hypoxia: the power and economy of Nepalese porters #6485
A. E. Minettia, L. P. Ardigob & F. Formentic; aInstitute of Human Physiology I, Faculty of Medicine, Univ. of Milano, Italy; bMotion Science Faculty, Univ. of Verona, Italy; cInstitute of Biophysical and Clinical Research into Human Movement, Manchester Metropolitan Univ., Cheshire, Alsager, UK

2 Musculoskeletal Mechanics-Joint ISB Track
2.7.7 Musculoskeletal Modelling (Lower extremity biomechanics)
Chairs: Maarten Bobbert, Ton van den Bogert

Wednesday, August. 2
Room R0.002

14:00-14:15 A musculoskeletal model for the determination of muscle forces and joint reactions in human legs during jumps #5282
Wojciech Blajer, Krzysztof Dziewiecki, and Zenon Mazur; Institute of Applied Mechanics, Technical Univ. of Radom, Poland

14:15-14:30 Sensitivity of Muscle Force Estimates in Human Gait to Variations in Muscle-Tendon Properties #5294
Christian Reddb, Margit Gfoehlera and Marcus G. Pandyb; aInstitute for Engineering Design and Logistics Engineering, Vienna Univ. of Technology, Vienna, Austria; bDept. of Mechanical and Manufacturing Engineering, Univ. of Melbourne, Victoria, Australia

14:30-15:00 Human Vertical Jump at Resonance #4152
Jan Babič, Jadran Lenarčič; Dept. of Automatics, Biocybernetics and Robotics, Jožef Stefan Institute, Ljubljana, Slovenia

15:00-15:15 A hopping robot controlled by an artificial neural network #6437
Daniel P. Ferrisab, Thomas J. Serbowiczc, Catherine R. Kinnaird; aKinesiology, bBiomedical Engineering and ‘Mechanical Engineering, Univ. of Michigan, Ann Arbor, MI, USA
15:15-15:30 A Multi-Scale Analysis of Leg Muscle Contraction Mechanics during a Leg Press
Exercise #7251
Alaa A. Ahmed a, Darryl E. Thelen b, Benjamin R. Whittington b, James A. Ashton-Miller a
a Univ. of Michigan-Ann Arbor, USA; b Univ. of Wisconsin, Madison, USA

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.2.3 Falls
Session Organizer/Chair: Jaap van Dieën
Wednesday, August 2
Room R1.046
14:00-14:15 Lateral instability and falls in aging: Experimental and modeling approaches #7734
Mark W. Rogers a, Marjorie Johnson Hilliard b, Katherine Martinez a, Marie-Laure Mille a, James L. Patton b, c Dept. of Physical Therapy and Human Movement Sciences, Northwestern Univ., Chicago, IL, USA, and b Sensory Motor Performance Program, Rehabilitation Institute of Chicago, Chicago, IL, USA
14:15-14:30 Group differences among fall-prone individuals and healthy old and younger counterparts utilizing nonlinear stability measures #7853
K.P. Granata and T.E. Lockhart; Musculoskeletal Biomechanics Laboratory, Locomotion Research Laboratory, Virginia Polytechnic Institute and State Univ., Blacksburg VA, USA.
14:30-14:45 Mechanical simulation for hip fracture by a fall using multibody-FE hybrid human model #7386
Sota Yamamoto a, Eiichi Tanaka a, Takeshi Ikeda a, Yasuharu Kubouchi a, Atsushi Harada c, Hiroyasu Okuzumi a, Dept. of Mechanical Science and Engineering, Nagoya Univ., Nagoya, Japan; b Accenture, Tokyo, Japan; c Dept. of Orthopedic Surgery, National Center for Geriatrics & Gerontology, Aichi, Japan
14:45-15:00 Effects of running and age-related degeneration in leg extensor muscles on recovery behaviour after a fall #6569
Kiros Karamanidis, Adamantios Arampatzis; Institute for Biomechanics and Orthopaedics, German Sport Univ. of Cologne, Germany
15:00-15:15 The Effects of Sensory Loss on Orbital Stability of Walking #6068
Jonathan B. Dingwell, Hyun Gu Kang; Dept. of Kinesiology, Univ. of Texas, Austin, Texas, USA
15:15-15:30 Age differences in 3-D segmental acceleration during gait at self-selected and fast walking speeds #4860
Vassilios G. Vardaxis; Des Moines Univ., Des Moines, USA

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.4.3 Spine Mechanics
Session Organizers: Tom Oxland, V. J. Goel
Wednesday, August 2
Room R0.006
14:00-14:15 Static and dynamic analysis of human cervical spine response under axial loading #4892
Marek Gzik a, Dagmara Tejszerska a, Wojciech Wolański a; a Dept. of Applied Mechanics, Silesian Univ. of Technology, Gliwice, Poland
14:15-14:30 A case for establishing local vertebral coordinate systems for evaluating muscle contributions to spine stability #6488
Samuel Howarth, Stuart McGill; Univ. of Waterloo, Dept. of Kinesiology, Waterloo, Ontario, Canada
14:30-14:45 A Buckling Analysis Related to Adolescent Idiopathic Scoliosis #7106
Suresh Shrivastava and Micheline Reimbold; Dept. of Civil Engineering and Applied Mechanics, McGill Univ., Montreal, Quebec, Canada

14:45-15:00 Validation of a specific device for isometric and isokinetic assessment of the cervical spine muscles in sagittal and coronal planes #6976

a,b Lecompte Jennyfer, a Maïsetti Olivier, a Thoreux Patricia, a,b,c Portero Pierre

a Institute of Myology, Pitié-Salpêtrière Hospital, Paris, France; b Laboratory of Biomechanics, UMR CNRS 8005, Ecole Nationale Supérieure d'Arts et Métiers, Paris, France; c Dept. of Sport Sciences, Univ. Paris XII, Créteil, France

15:00-15:15 Imbalanced bone growth and muscle forces affecting on spinal curve deformation of idiopathic scoliosis #7606

Masao Tanaka a, Shinji Nishi a, Sohei Ebara b, Takeshi Matsumoto a, Hisashi Naito a

a Dept. of Mechanical Science and Bioengineering, Graduate School of Engineering Science, Osaka Univ., Osaka, Japan; b Spine Center, Chigasaki Tokushukai Medical Center, Chigasaki, Kanagawa, Japan

15:15-15:30 The effect of various bone conditions on the biomechanics of the thoracolumbar spine – finite element study #7077

M.A. Tyndyk a, V. Barrona, P.E. McHugh b, h; a National Centre for Biomedical Engineering Science, NUI, Galway, Ireland; h Dept. of Mechanical and Biomedical Engineering, NUI, Galway, Ireland

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track

3.5.3 Walking Dynamics

Session Organizers: Dieter Rosenbaum, Fabio Catani

Chairs: Dieter Rosenbaum

Wednesday, August 2

Room R1.006

14:00-14:15 Novel: The Type of the foot also responsible for Sensory & Musculo Skeletal Changes in the foot The Effect of Type of Foot on SNCV, Vibratory Threshold, and Dynamic Analysis in Females #5350

S.D Nishith, P.DhakshinaMoorthy, Rahul Singh Parihar; Research Lab, Sardar Bhagwan Singh P.G Institute, Dehradun, INDIA

14:15-14:30 Gait transition as natural response of the mechanical system #7195

E. Dittrich, S. Lipfert, H. Geyer, A. Seyfarth; Locomotion Laboratory, Jena Univ., Germany

14:30-14:45 Orbital stability of passive dynamic walking on an irregular surface #5478

Jimmy Li-Shin Su, Jonathan B. Dingwell; Nonlinear Biodynamics Laboratory, Univ. of Texas, Austin, TX, USA

14:45-15:00 Application feasibility of accelerometer based gait analysis in clinical orthopaedics #7385

Grimm B1, Vanderhenst T1, Münch C2, Heyligers I1, 4 Atrium Medical Center, Dept. Orthopaedics, Heerlen, the Netherlands; b Univ. Maastricht, Dept. Movement Science, Maastricht, the Netherlands

15:00-15:15 The effect of shoes on ankle injuries #5062

Robin Kerr, Graham Arnold, Lynda Cochrane, Tim Drew, Rami Abboud

Institute of Motion Analysis & Research (IMAR), Univ. of Dundee, Scotland, UK.

15:15-15:30 Biomechanical characterization of artificially induced crouch walking #4742

Zlatko Matjačić, Andrej Olenšek; Institute for Rehabilitation, Ljubljana, Slovenia

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track

3.6.1 Gait Variability

Session Organizer /Chair: Jeffrey Hausdorf

Wednesday, August 2

Room R0.005

16:00-16:15 Gait Dynamics in Older Adults with a High Level Gait Disorder: A Prospective Study #6455

Jeffrey M. Hausdorf a,c, Vered Huber-Mahlin a,c, Talia Herman a, Chava Peretz b, h, Leor Gruendlinger a, Nir Giladi b, a Movement Disorders Unit, Dept of Neurology, Tel-Aviv Sourasky Medical Center, Tel-Aviv, Israel; b Sackler Faculty of Medicine, Tel-Aviv Univ., Tel-Aviv, Israel; h Division on Aging, Harvard Medical School, Boston, MA, USA
16:15-16:30  Gait Variability in Elderly Persons #7753
Rolf Moe-Nilssen, a Jorunn L. Helbostad; a The Balance and Gait Unit, Section of Physiotherapy Science, Dept. of Public Health and Primary Health Care, Univ. of Bergen, Norway; b Section of Geriatric Medicine, St. Olav Hospital, and Inst. of Neuromedicine, Norwegian Univ. of Science and Technology, Trondheim, Norway

16:30-16:45  Repeatability and Uncertainty of a Protocol in Children Gait and Database for a Reference Group #7133
Ayman Assi a,b, Ismat Ghanem b,c, Francois Lavaste a, Wafa Skalli a; a Laboratoire de Biomécanique, CNRS UMR 8005, ENSAM, Paris, France; b Gait and Motion Analysis lab. - SESOBEL, Ain El Rihani – Beirut, Lebanon; c HôpitalHôtel-Dieu de France, Beirut, Lebanon

16:45-16:00  Can Early Post-OP Gait Predict Implant Longevity? #7576
Wimmer, MA a, Schwenke, T b, Salmeros, M c, Andriacchi, TP d; a Rush Univ. Medical Center, Chicago, IL, USA; b Stanford Univ. Palo Alto, CA, USA

16:00-16:15  Mid-swing kinematic trunk states predict step width #4913
P.M. Fowler, K.L. Troy, M.D. Graber; Univ. of Illinois at Chicago, Chicago, IL, USA

16:15-16:30  Are long-range correlations in stride intervals centrally mediated? #5238
Deanna H. Gates, Jonathan B. Dingwell; Nonlinear Biodynamics Laboratory, Univ. of Texas, Austin, TX, USA

4. Implants for Trauma and Orthopedics-Joint ESB Track
4.4.2 Spinal Implants - Fixation and Augmentation

Chairs: Po-Quang Chen, Stephen Ferguson

Wednesday, Aug. 2.
Room E1.03

14:00-14:15  Comparison and Prediction of Pullout Strength of the Conical and Cylindrical Pedicle Screws within Synthetic Bone # 6667
Wen-chi Tsai a, Son-Jyh Lin b, Ting-Min Wang c, Po-Quang Chen a; a Dept. of Biomedical Research Institute, National Taiwan Univ., Taipei, Taiwan; b Dept. of Bio-mechanical Engineering, National Central Univ., Chung-lǐ, Taiwan; c Dept. of Orthopedic Surgery, National Taiwan Univ. Hospital, Taipei, Taiwan

14:15-14:30  Stress analysis and optimal design of pedicle screws using finite element method and DOE approach #5397
Farzam Farahmand, Vahid Reza Parichehreh; Sharif Univ. of Technology, Tehran, Iran

14:30-14:45  Effect of a transforaminal compared to two posterior lumbar interbody fusion cages on segmental stability in vitro #6193
Kettler A, Schmoelz W, Kast E, Gottwald M, Claes L, Wilke HJ; Institute for Orthopaedic Research and Biomechanics, Univ. of Ulm, Germany

14:45-15:00  In Vivo determination of the dynamics of normal, fused and disc replacement cervical spines #4308
Fei Liu a, Richard Komistek a, Mohamed Mahfouz b; Joseph Cheng b; a Dept. of Biomedical Engineering, the Univ. of Tennessee, Knoxville, USA; b Vanderbilt University School of Medicine, Nashville, TN, USA

15:00-15:15  Vertebral endplate deformation before and after vertebral augmentation with polymethylmethacrylate (PMMA) determined by micro-CT #6925
Paul Hulme a, Steven K. Boyd b, Paul F. Heinic d, Stephen J. Fergusona a; a MEM Research Center, Univ. of Bern, Bern, Switzerland; b Dept. of Mechanical and Manufacturing Engineering, Univ. of Calgary, Alberta, Canada; c Inselspital Bern, Bern, Switzerland

15:15-15:30  Spine Pearls - A new technique to fill the bone defect after internal reduction of osteoporotic vertebral fractures #4251
Werner Schmoelz a, Michael Blauth a, Joerg Huber b; a Dept. of Trauma Surgery and Sports Medicine, Medical Univ. Innsbruck, Austria; b Orthopädische Klinik, Kantonsspital AG, Aarau, Switzerland

5. Occupational and Impact Injury Biomechanics
5.5.2 Thorax Injury Biomechanics

Session Organizer /Chair: Richard Kent

Wednesday, August 2
Room R0.058

14:00-14:15  Investigation of Potential Mechanisms of Traumatic Rupture of the Aorta #5245
Warren N. Hardy, Chirag S. Shah, Matthew J. Mason, King H. Yang, Chris A. Van Ee, and Kennerly Diggles; "Bioengineering Center, Wayne State Univ., Detroit, Michigan, USA; Design Research Engineering, Novi, Michigan, USA; "National Crash Analysis Center, The George Washington Univ., Ashburn, Virginia, USA

14:15-14:30  Thoracic Injuries in Far-Side Crashes #5498
Brian Fildes, H. Clay. Gabler, Kennerly Diggles and Michael Fitzharris; "Monash Univ. Accident Research Centre, Melbourne, Australia; Virginia Tech, Blacksburg, Virginia, USA; "George Washington Univ., Virginia, USA

14:30-14:45  Human body tolerance to high energy impacts: Influence of occupant torso tissue composition on real world crash injuries #5515
Stewart C. Wang, Craig Poster, Christopher Brede, Aaron Lange, David Lange, Richard Kent; "Univ. of Michigan, Ann Arbor, MI, USA; "Univ. of Virginia, Charlottesville, VA, USA

14:45-15:00  Novel Methods to Determine Pediatric Anterior-Posterior Thoracic Force-Deflection Characteristics #6984
Matthew R. Maltese, Kristy B. Arbogast, Vinay Nadkarni, Beth Winkelstein, Helge Mikkelsrud, Jon Nysaeter; "The Children’s Hospital of Philadelphia, USA; "Dept. of Pediatrics, The Univ. of Pennsylvania, Philadelphia, USA; "Dept. of Bioengineering, The Univ. of Pennsylvania, Philadelphia, USA; "Laerdal Medical Corporation, Stavanger, Norway

6. Sport Biomechanics-Joint ISB Track

6.4 Sports Activity -6.4.1. Jumping
Session Organizers /Chairs: M.R. Yeadon, Hermann Schwameder
Wednesday, August. 2
Room D2.12

14:00-14:15  Effects of phase ratio on the performance in the triple jump #5786
Bing Yu, Center for Human Movement Science, The Univ. of North Carolina at Chapel Hill, USA

14:15-14:30  Factors affecting optimum performance in a running jump for height #5385
Cassie Wilson, Mark A. King, Maurice R. Yeadon; "School of Sport, Univ. of Wales Institute, Cardiff, UK; "School of Sport and Exercise Sciences, Loughborough Univ., Loughborough, UK

14:30-15:00  Keynote: A comparison of activation timing profiles for single and double layout somersaults #5445
Mark A. King and Maurice R. Yeadon, School of Sport and Exercise Sciences, Loughborough Univ., Loughborough, UK

15:00-15:15  Modelling the muscle activation in springboard diving takeoffs #5420
P.W. Kong, M.R. Yeadon and M.A. King; "The Univ. of Texas at El Paso, Texas, USA; "Loughborough Univ., UK

15:15-15:30  Interactive visualisation of the flight phase of trampoline movements # 6113
Maurice R. Yeadon and Jon P. Knight, School of Sport and Exercise Sciences, Loughborough Univ., UK

11. Artificial Organs

11.1.3. Blood Purification and hemodialysis equipment
Session Organizers /Chairs: Dieter Falkengagen, Cecile Legallah
Wednesday, August. 2
Room R1002

14:00-14:30  Keynote New Technologies of Blood Purification Treatment #7908
D. Falkengagen, M. Brandl, Marion Ettenuaer, L. Hartmann, Viktoria Weber Center of Biomedical Technology, Danube Univ. Krems; Krems Austria

14:30-14:45  Multi-scale computational analysis of fluid dynamics in the Toraymyxin adsorption cartridge #5975
Gianfranco B. Fiore, Gualtiero Guadagni, Monica Soncini, Simone Vesentini, Alberto Redaelli; "Dept. of Bioengineering, Politecnico di Milano, Milan, Italy
14:45-15:00 Moved to Poster Session

15:00-15:15 Flow Visualisation Studies with Different Dialysis Catheters in a Model of the Vena Cava Superior and the Right Atrium in Variant Positions #7824
Stock Martin, Liesch Dieter, Topakli Levent, Coli Luigi; "Univ. of Applied Sciences, Munich, Germany; "Technical Univ. Munich, Germany; "Politecnico S.Orsola Malpighi, Bologna, Italy

15:15-15:30 Dialysis equipment: safety and usability – Actual situation and progress in the relevant standards #7825
Dr. Carsten Mueller; Fresenius Medical Care, Schweinfurt, Germany

12. Biomaterials
12.1.2 Biomaterials for Therapeutic Delivery
Session Organizers /Chair: Yannis Missirlis, Hasan Uludag
Wednesday, August 2
Room R1.001

14:00-14:30 Affinity Technology and Wet Chemistry in the Design of Bioactive Implant Surfaces #7044
Herbert P. Jennissen; Institut für Physiologische Chemie, Universität Duisburg-Essen, Universitätsklinikum Essen, Germany

14:30-15:00 Potential of Lipid-Modified Polycations to Transfer Plasmid DNA into Bone Marrow Stromal Cells (BMSC) #4056
Hasan Uludag, Vanessa Incani, Emily Tunis, Basak Acan, Cori Olsen, Cezary Kucharski, Aziz Ghahary, and Asfaneh Lavasanifar; Chemical & Material Engineering Dept., Faculty of Engineering, Univ. of Alberta, Alberta, Canada

15:00-15:15 Effect of cell passage number on BMP-2 response in MC3T3-E1 cells #7253
Markus Laub and Herbert Jennissen; Universitätsklinikum Essen, Institut für Physiolog. Chemie, Essen

13. Respiratory Mechanics
13.5 Assessment of Pulmonary Function
Session Organizers /Chairs: Jason Bates, Zoltan Hantos
Wednesday, Aug. 2
Room R2.088

14:00-14:15 Assessment of lung mechanics in mouse models of airways hyperresponsiveness #5240
Jason H.T. Bates; Vermont Lung Center, Univ. of Vermont College of Medicine, Burlington, Vermont, USA

14:15-14:30 Interdependence of airway and tissue mechanics #6847
Zoltán Hantos, a,b, *Dept. of Medical Informatics and Engineering, Univ. of Szeged, Hungary; bCentre for Child Health Research, Univ. of Western Australia, Perth, WA, Australia

14:30-14:45 Short-term airway variation and bronchodilation in children with asthma #5490
G.N. Maksym, a, C.A. Lall, a, P. Pianosi b, P. Hernandez c; a Biomedical. Engineering, Dalhousie Univ., Halifax, Canada; b Pediatric & Adolescent Medicine, Mayo Clinic, Rochester, USA; c Respirology, QEII Health Sciences Centre, Halifax, Canada

14:45-15:00 Respiratory input impedance in normal subjects and COPD patients #5581
Ellie Oostveen; Dept. of Pulmonary Medicine, Univ. Hospital Antwerp, Belgium

15:00-15:15 Assessment of airway function during sleep #4178
Ramon Farré; Unitat Biofísica i Bioenginyeria, Facultat Medicina, Universitat Barcelona-IDIBAPS, Barcelona, Spain

15:15-15:30 Lung and chest wall dynamics during rest and exercise without and with expiratory flow limitation #7534
Andrea Aliverti; TBM Lab, Politecnico di Milano, Italy
14. Cardiovascular Mechanics
14.3.5 Hemodynamics (General)
Session Organizer /Chair: Niko Stergiopulos, P. Segers
Wednesday, August 2
Room G2.36

14:00-14:15 Dispersion of Angiographic Contrast in Arterial Blood #5892
Baruch Barry Lieber a,b, Qing Hao a
Department of a Biomedical Engineering and of b Radiology, University of Miami, USA

14:15-14:30 Flow and Deformation in Initially Curved Stenosis Model of Arterial Disease #6202
Shunichi Kobayashi a, Yuuki Ayama a, Hirohiro Morikawa a, Dalin Tang b, David N. Ku a
a Dept. of Functional Machinery and Mechanics, Shinshu Univ., Ueda, Nagano, Japan; b Mathematical Sciences Dept., Worcester Polytechnic Institute, Worcester, MA, USA; c GWW School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA, USA

14:30-14:45 Impedance pump as a cardiovascular assist device #6652
Lea Waisman a, Moshe Rosenfeld a and Shmuel Einav b; Dept. of Biomedical Engineering, Faculty of Engineering, Tel Aviv Univ., Tel Aviv Israel; School of Mechanical Engineering, Faculty of Engineering, Tel-Aviv Univ., Tel Aviv, Israel

14:45-15:00 Does Pressure Wave Reflection Contribute To Aortic Root Dilatation In Patients With Marfan Disease? #6659
Patrick Segers a, Julie De Backer a,c, Dan Devos d, Thierry Gillebert e, Luc Van Bortela, Stein Inge Rabben f, Johan De Sutter g, Anne De Paep h, Pascal Verdonck i; Cardiovascular Mechanics and Biofluid Dynamics research unit, Institute Biomedical Technology, Ghent Univ., Ghent, Belgium; Dept. of Medical Genetics, Cardiac Medicine, Medical Imaging, Heymans Institute of Pharmacology, Ghent Univ. Hospital, Ghent, Belgium; Institute for Surgical Research, Rikshospitalet Univ. Hospital, Oslo, Norway

15:00-15:15 Simultaneous Digitization of Intracoronary Doppler and Pressure to Assess the Influence of Diastolic Dysfunction on the Hyperemic Coronary Pressure-Flow Relationship after Myocardial Infarction # 6717
Paul L. Van Herck a, Marc J. Claeyse a, Steven E. Haine a, Peter Gorissen a, Hielko Miljoen a, Johan M. Bosmans a, Christiaan J. Vrints b, Stéphane G. Carlier b; a Dept. of Cardiology, Univ. Hospital of Antwerp, Edegem, Belgium; b Columbia Univ. and Cardiovascular Research Foundation, New York, NY, USA

15:15-15:30 “The push me pull you” of coronary haemodynamics #7711
Justin E Davies a, Darrel P Francis b, Jazmin Aguado-Sierra c, Kim H Parker b, Alun D Hughes b, Jamil Mayet c; a International Centre for Circulatory Health, Imperial College and St Mary’s Hospital, London, United Kingdom; b Dept. of Bioengineering, Physiological Flow Unit, Imperial College, London, United Kingdom

14. Cardiovascular Mechanics
14.5.4. Cardiac or Coronary Applications
Session Organizers /Chairs: Charles A. Taylor, Francesco Migliavacca
Wednesday, August 2
Room G1.27

14:00-14:30 Keynote: The Role of Cardiac Mechanics in Diagnosis and Treatment of Myocardial Ischemia and Infarction #6515
Jeffrey W. Holmes; Cardiac Biomechanics Group, Columbia Univ., New York NY, United States of America

14:30-14:45 Myocardial mechanics during epicardial versus endocardial left ventricular pacing: simulations and experiments #5242
Roy Kerckhoff a, Pierre Bordachar a, Sarah Healy a, Jeff Oomens c, Andrew McCulloch a
a Dept. of Bioengineering, UC, San Diego, USA; b Univ. Victor Segalen, Bordeaux, France; c Dept. of Medicine, UC, San Diego, USA

14:45-15:00 Quantification of regional cardiovascular mechanics from dynamic-CT data #5976
Elena S. Di Martino a, Isabella Verdinelli a, Emiliano Votta a, David Schwartzman d
a Institute for Complex Engineered Systems, Carnegie Mellon Univ., Pittsburgh, PA, USA
14. Cardiovascular Mechanics

14.6.3 Computational Modelling

Session Organizers / Chairs: David Steinmann

(Incorporating presentations from Thread 1 Computational Methods in Biomechanics and Mechanobiology
Thread organizers: Gerhard A. Holzapfel, Tim David)

Wednesday, August 2

Room R1.007

14:00-14:30 Keynote: Computational modeling of arterial platelet thrombosis in stenotic vessels #4636
Aaron Fogelsona,b, Robert D. Guyc; Deps. of Mathematicsa and Bioengineeringbc; Univ. of Utah, Salt Lake City, UT, USA

14:30-14:45 Multiscale modeling of blood flow: Coupling of Dissipative Particle method and Finite Element method #4835
Milos Kojica,b, Nenad Filipovicab, Akira Tsuda
c
Harvard School of Public Health, Boston MA, USA; bUniv. of Kragujevac, Serbia

14:45-15:00 Effect of Red Blood Cells on Shear-Induced Platelet Activation: A Micro-scale Computational Simulation #4346
T. Almomani, J.S. Marshall and K.B. Chandran; a Dept. of Biomedical Engineering and b Dept. of Mechanical and Industrial Engineering, The Univ. of Iowa, Iowa City, IA, USA

15:00-15:15 A time-dependent model for shear stress induced ATP release from vascular endothelial cells #5267
Kai-Rong Qiua, Zhe Xuc, Hui Zhangd, Cheng Xiangd, Shuzhi Sam Ged, and Zong-Lai Jianga
a Institute of Mechanobiology & Medical Engineering, School of Medicine, Shanghai Jiao Tong Univ., Shanghai, China; bDept. of Electrical and Computer Engineering, National Univ. of Singapore; cInstitute of Biomechanics, Fudan Univ., Shanghai, China

15:15-15:30 Effect of pressure on arterial vasomotion #4730
M. Koenigsberger, R. Sauser, JL. Bény and JJ. Meister
a Laboratory of Cell Biophysics, Ecole Polytechnique Fédérale de Lausanne, Switzerland; bDept. of Zoology and Animal Biology, Univ. of Geneva, Switzerland

15. Microcirculation

15.3.3 Flow in Microchannels and Microvessel Networks: Flexible Particles (Cells, Vesicles) and Cell-Vascular Wall Interactions

Session Organizers / Chairs: D. Barthès-Biesel, S. Weinbaum

Wednesday, August 2

Room R1.005

14:00-14:30 The revised Starling Principle and fluid exchange along a microvascular network #5236
F. E. Curry, R. H. Adamson, J. Ly, X. Zhang and S. Weinbaum

aDept. of Physiology and Membrane Biology, Univ. of California at Davis, CA, USA and bDepts. of Biomedical and Mechanical Engineering, City College, CUNY, NY, USA
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<th>Time</th>
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<tr>
<td>14:30-14:45</td>
<td>Carbohydrate-mediated Metastatic Cell-specific Interactions with Arteriolar Endothelium #4100</td>
<td>Virginia H. Huxley and Olga Glinskii; Dept. Medical Pharmacology &amp; Physiology and National Center for Gender Physiology, Univ. of Missouri School of Medicine, Columbia, MO, USA</td>
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<td>14:45-15:00</td>
<td>Contributions of Adhesion Molecule Expression to Leukocyte Interactions with Arteriolar Endothelium #4125</td>
<td>Ingrid H. Sarelius, Ronen Sumagin, Dept. of Pharmacology and Physiology, Dept. of Biomedical Engineering, Univ. of Rochester, Rochester, NY, USA</td>
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<td>15:00-15:15</td>
<td>On the Interaction of White Blood Cells with the Endothelial Glycocalyx #4097</td>
<td>Yuefeng Han, Sheldon Weinbaum, Jos A. E. SPAAN, Hans Vink, Depts. of Biomedical and Mechanical Engineering, CUNY Graduate Center and the City College of New York, New York, NY, USA; Dept. of Medical Physics, Academic Medical Center, Univ. of Amsterdam, Amsterdam, The Netherlands</td>
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<td>15:15-15:30</td>
<td>Effects of a transient pressure gradient on endothelial F-actin cytoskeleton and beta-catenin #5160</td>
<td>Ann Linda Baldwin and Jonathan Alberding; Bioengineering program, Univ. of Arizona, Tucson, Arizona, USA</td>
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17. Biomechanics in Nature

17.5.2 Terrestrial Locomotion

Session Organizers: Andy Biewener, Alan Wilson

Wednesday, August 2

Room R1.087

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<tr>
<td>14:00-14:15</td>
<td>Collision costs in terrestrial gaits #6356</td>
<td>John E.A. Bertram, Andy Ruina, Manoj Srinivasan, Univ. of Calgary, Calgary, Canada</td>
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<td>b Cornell Univ., Ithaca, USA</td>
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<td>14:15-14:30</td>
<td>Mechanics of carrying head supported loads #7644</td>
<td>P.A. Willems, G.J. Bastien and N.C. Heglund; Université catholique de Louvain, Louvain-la-Neuve, Belgium</td>
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<td>14:30-14:45</td>
<td>Walking BigDog: Insights and challenges from legged robotics #7493</td>
<td>Gabriel Nelson, Kevin Blankespoor, Marc Raibert; Boston Dynamics, Cambridge, Massachusetts, USA</td>
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<td>14:45-15:00</td>
<td>Coping with increased gravity: mechanics of bend running #7087</td>
<td>Jim Usherwood; The Royal Veterinary College, London, UK</td>
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<td>15:00-15:15</td>
<td>Integrated muscle-tendon function during running accelerations #7415</td>
<td>Thomas J. Roberts; Brown Univ., Providence, USA</td>
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15:15-15:30  | Analysis of joint force and torque for the foot during bipedal human walking with a hybrid-multi-body model of whole biological body #4494 | Weijie Wang, Robin Crompton, Michael Günther, Rami Abboud; Institute of Motion Analysis and Research, Univ. of Dundee, Dundee, UK; Dept. of Human Anatomy and Cell Biology, Univ. of Liverpool, Liverpool, UK |

18. Trends in Cranial and Spinal Biomechanics

18.1.4 Flow in Cerebral Aneurysms

Session Organizers /Chairs: B. Lieber, Hiroshi Ujiie

Wednesday, August 2

Room R2.091

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<tr>
<td>14:00-14:15</td>
<td>Flow simulation in real and idealized intracranial aneurysms: effects of geometry, resolution and method #6895</td>
<td>K.N.Beronov, F.Durst, E.L.Ramirez; Lehrstuhl für Strömungsmechanik, Universität Erlangen-Nürnberg, Erlangen, Germany</td>
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<tr>
<td>14:15-14:30</td>
<td>Particle Image Velocimetry and Numerical Simulation: A first step to validation simulating flow in idealized models of cerebral aneurysms #6954</td>
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Luca Augsburger a,b, Philippe Reymond a, Mohamed Farhat c, Edouard Fonck a,b, Daniel A. Rufenacht b, Nikos Stergiopoulos c, Laboratory of Hemodynamics and Cardiovascular Technology, Federal Institute of Technology, Lausanne Switzerland; b Neuroradiology, Radiology Dept, Univ. Hospital of Geneva, Switzerland; c Hydraulic Machines Lab, Federal Institute of Technology, Lausanne, Switzerland

14:30-14:45 Computational geometric analysis of cerebral aneurysms and their parent vasculature from CRA #7331
Marina Piccinelli a, Edoardo Boccardi b, Susanna Bacigaluppi b, Alessandro Venezani d, Bogdan Ene-Iordache c, Andrea Remuzzi a, Luca Antiga a, Bioengineering Dept., Mario Negri Institute, Bergamo, Italy; b Dept. of Neuroradiology, Niguarda-Ca’ Granda Hospital, Milano, Italy; d Univ. of Milan, Neurosurgery, Ospedale Maggiore Policlinico-Fondazione IRCCS, Milano, Italy; d MOX, Politecnico di Milano, Milano, Italy

14:45-15:00 Withdrawn

15:00-15:15 Similar hemodynamic features in elastase-induced rabbit saccular aneurysms compared to those of humans aneurysms #5884
Hasballah Zakaria a, David F. Kallmes b, Ramanathan Kadirvel b, Yong Hong Ding b, Daying Dai, Debra A. Lewis, Anne M. Robertson; a Dept. of Mechanical Engineering, Univ. of Pittsburgh, PA, USA; b Dept. of Radiology, Mayo Clinic, Rochester, MN, USA

19. Biotransport
19.4.2 Transport in Native and Engineered Cells and Tissues
Session Organizer /Chair: George Truskey
Wednesday, August. 2
Room, R0.003

14:00-14:15 Macroscopic transport phenomena in native and engineered cartilage tissue #4705
Masao Watanabe a, Yoshinori Sawae b, Kenta Haari a, Souichirou Sugino a, Yousuke Kitajima a, Toshiyuki Sanada a, Teruo Murakami b; a Dept. of Mechanical Engineering Science, Kyushu Univ., Fukuoka, Japan; b Dept. of Intelligent Machinery and Systems, Kyushu Univ., Fukuoka, Japan

14:15-14:30 Cyclic loading induced tissue deformation, interstitial flow and elevated solute transport in extracellular matrices #5971
Wen Wang and Yiling Lu; Medical Engineering Division, Dept. of Engineering, Queen Mary, Univ. of London, London, UK

14:30-14:45 Withdrawn

14:45-15:00 Diffusivity of rat bone predicted by stochastic network models compared with results from FRAP experiments #7287
Roland Steck a, Ravi Patel b, Michael Schütz a, Melissa L. Knothe Tate b, d; a Institute of Health and Biomedical Innovation, and School of Engineering Systems, Queensland Univ. of Technology, Brisbane, Australia; b, d Dept. of Biomedical Engineering, c School of Medicine, and d Dept of Mechanical & Aerospace Engineering, Case Western Reserve Univ., Cleveland, OH, USA

15:00-15:15 Red blood cells as carrier for nanoparticles #7357
Hans Bäumler, M. Brähler, A. Lemke, J. Möschwitzer, A. Müller, J. Pinkernelle, V. Staedtke, U. Teichgräber, Charité - Universitätsmedizin Berlin, Germany

15:15-15:30 Computational Study of Chronic Myelogenous Leukemia Culture in a 3d Perfusion Bioreactor #6474
Chi Yip Joan Ma, Athanasios Mantalaris, Xiao Yun Xu; Dept. of Chemical Engineering, Imperial College London, London, UK

20. Biomechanics of Organs
20.5.2 Biomechanics of Skin
Session Organizer: Frank Baaijens
Wednesday, August. 2
Room R1.008

14:00-14:15 Biomechanical properties of a skin of wild and periostin-null mouse #5289
The effect of cathodal and anodal electric stimulation (IDC) on the biomechanical properties of pressure sore in guinea pig #5305
Fateme Jamshidi a, Giti Torkaman b, Mohammad Firoozabadi b; a Tabriz Medical Science Univ., Tabriz, Iran; b Tabriz Medical Science Univ., Dept. of Physical Therapy, Teheran, Iran

Thermo-mechanical analysis of skin tissue #5470
F. Xu 1, T. Wen 1, T.J. Lu 1,2, R. McMahon 1; 1 Dept. of Engineering, Univ. of Cambridge, Cambridge, UK; 2 School of Aerospace, Xian Jiaotong Univ., Xian, P.R. China

Finite Element Model of Mechanical Properties of Human Skin In Vivo Under Indentation Coupled With MRI Technique #5719
V. Tran 1, F. Charleux 2, D. Capron 1, A. Ehrlacher 2, M.C. Hobatho 1; 1 Laboratoire de Biomécanique et Biomédicale, Université de Technologie de Compiègne, Compiègne, France; 2 Centre d’Imagerie Médicale Avancé, Compiègne, France Laboratoire Analyse des Matériaux et Identification, Ecole Nationale des Ponts et Chaussées, Paris, France

In-vitro investigation of the physical properties of the skin #6730
Sylwia Szotek a, Romuald Będziński a, Magdalena Kobielarz a, Krzysztof Maksymowicz b, Stanislaw Pielka a, Piotr Kuproka a, a Biomedical Engineering and Experimental Mechanics Division, Wrocław Univ. of Technology, Wrocław, Poland; b Dept. of Forensic Medicine, Wrocław Medical Univ., Wrocław, Poland; c Dept. of Anatomy and Histology, Agricultural Univ. of Wrocław, Wrocław, Poland

In vivo and in vitro viscoelastic behavior of healing skin in a porcine model #6988
David T. Corr a,c, Corrie L. Gallant-Behm b,c, David A. Hart b,c, Nigel G. Shrive b; Depts. of a Civil Engineering, b Surgery, c Medicine, Univ. of Calgary, Calgary, AB, Canada

Thread 1: Computational Methods in Biomechanics and Mechanobiology

T1.8 Material Stability Aspects for Biological Tissues
Session Organizer /Chair: Jörg Schröder
Wednesday, August 2
Room G0.43

Materially Stable Constitutive Equations for Arterial Walls Based on Polyconvex Energies. Application to Damage Modeling and Residual Stresses #4119
D. Balzani a, J. Schröder b, P. Nef f c, G.A. Holzapfel c; a Institute of Mechanics, Dept. of Civil Engineering, Univ. of Duisburg-Essen, Essen, Germany; b Dept. of Mathematics, Univ. of Duisburg-Essen, Essen, Germany; c Dept. of Solid Mechanics, Royal Institute of Technology (KTH), Stockholm, Sweden

Loss of Ellipticity for Fiber Reinforced Materials #5629
P. Neff; Dept. of Mathematics, Darmstadt Univ. of Technology, Darmstadt, Germany

On snap cavitation instabilities for a particular class of biomaterials #1822
José Merodio a and Giuseppe Saccomandi b; a Dept. of Continuum Mechanics and Structures, E.T.S. Ing. Caminos, Canales y Puertos, Universidad Politécnica de Madrid, Madrid, Spain; b Dipartimento di Ingegneria dell’Innovazione, Sezione di Ingegneria Industriale, Università degli Studi di Lecce, Lecce, Italy

Constitutive Modeling of Viscoelastic Collagen Fibers by Means of a Polyconvex Polynomial–Type Strain-Energy Function #4468
B. Markert, W. Ehlers, N. Karajan; Institute of Applied Mechanics (CE), Chair II (Continuum Mechanics), Univ. of Stuttgart, Germany

A polyconvex anisotropic hyperelastic model with application to soft biological tissues #6033
Alexander E. Ehret, Mikhail Itskov; Dept. of Continuum Mechanics, RWTH Aachen Univ., Aachen, Germany

Constitutive restrictions for a hyperelastic material, based upon strain invariants yielding orthogonal stress response terms #4535
Tsvetanka Sendova, Jay R. Walton; Texas A&M Univ., College Station, TX, USA
Thread 1: Computational Methods in Biomechanics and Mechanobiology

T1.14.4 Image-based anatomical modelling for CAD/FEA applications

Session Organizer /Chair: Panos Diamantopoulos

Wednesday, August 2
Room R2.007

14:00-14:15 Image-based biomechanical modelling in oral and maxillofacial practice #7677
D. Trikeriotis, P. Diamantopoulos; Oral and Maxillofacial Unit, IASO General Clinic, Athens, Greece; Medical School, Univ. of Athens, Greece

14:15-14:30 A route for digital design and manufacturing of customised maxillofacial implants #6798
S. Lohfeld, P. McHugh, D. Serban, D. Boyle, G. O’Donnell, and N. Peckitt
National Centre for Biomedical Engineering Science and Dept. of Mechanical and Biomedical Engineering, National Univ. of Ireland, Galway, Ireland; Dept. of Mechanical/Industrial Engineering, Galway-Mayo Institute of Technology, Galway, Ireland; ComputerGen Implants Ltd., St Chad's House, Hooton Pagnell, Doncaster, UK

14:30-14:45 Functional imaging and CFD analysis to perform Maxillo-Mandibular Osteotomy #5440
W. Vos, J. De Backer, A. Devolder, W. Okkerser, W. De Backer; Univ. of Antwerp, Dept. of Physics, Antwerp, Belgium; Univ. Hospital of Antwerp, Dept. of Dentistry, Antwerp, Belgium; Univ. Hospital of Antwerp, Dept. of Pulmonology, Antwerp, Belgium

14:45-15:00 Validation of image-enhanced in vivo microCT based FE models by strain gauge measurements #7438

15:00-15:15 withdrawn

15:15-15:30 An automatic method to generate patient specific finite element head model #7668
Johnson Ho, Svein Kleiven; CTV - Centre for Technology in Health, Royal Institute of Technology, Huddinge, Sweden

Thread 4: Imaging

T4.4 Imaging in Cellular and Molecular Biomechanics

Session Organizer: Melissa Knothe Tate

Wednesday, August 2
Room R0.056

These presentations are in conjunction with Track 10 Cellular and Molecular Mechanics

14:00-14:30 Keynote/In Situ Imaging of Bone Cells: Opportunities for Elucidating a Cellular Basis of Bone Disease and Challenges for Clinical Translation #7861
Melissa L. Knothe Tate; Depts. of Biomedical and Mechanical & Aerospace Engineering Case Western Reserve Univ., Cleveland, OH, USA

14:30-14:45 Time response of the canal network in cortical bone to sciatic neurectomy in growing rats: a synchrotron radiation μCT study #6525
Takeshi Matsumoto, Masayuki Yoshino, Kentaro Uesugi, Masao Tanaka; Bioengineering Division, Osaka Univ. Graduate School of Engineering Science, Toyonaka, Japan; SPring-8/Japan Synchrotron Radiation Research Institute, Kouto, Japan

14:45-15:00 Cellular phenotyping of the mouse skeleton using synchrotron based nano-computed tomography #7843
P Schneider, D Webster, E Wasserman, M Stauber, M Stampanoni, R Müller; Institute for Biomedical Engineering, Univ. and ETH Zurich, Switzerland; Swiss Light Source, Paul Scherrer Institut, Villigen, Switzerland

15:00-15:15 Calcium response in isolated chick osteocytes and osteoblasts to direct deformation #6766
Mototsugu Tanaka, Yuki Aonuma, Taiji Adachi, Hiroshi Kamioka, Teruko Takano-Yamamoto, Masaki Hojo; Dept. of Mechanical Engineering and Science, Graduate School of Engineering, Kyoto Univ., Kyoto, Japan; Graduate School of Cultural Studies and Human Science, Kobe Univ., Kobe, Japan; Dept. of Orthodontics, Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama Univ., Okayama, Japan

15:15-15:30 Response of Chondrocytes to Tensile Strain in Situ #4364
Thread 4: Imaging
T4.7.2 Quantitive Functional Imaging
Chair: Jess. G. Snedeker, Ron F. Zernicke

Wednesday, August 2
Room R1.003

14:00-14:15 Validation and quantification of an in vivo model of functional bone adaptation #6416
Chris J. MacKay*, Grant C. Goulet*, David M. L. Cooper*, Dennis Coombe*, and Ronald F. Zernicke*; a McCaig Centre for Joint Injury and Arthritis Research, Univ. of Calgary, Canada; b Schulich School of Engineering, Univ. of Calgary, Canada; c Dept. of Orthopaedics, Univ. of British Columbia, Vancouver, Canada; d Computer Modelling Group, Ltd., Calgary, Alberta, Canada; e Faculties of Kinesiology and Medicine, Univ. of Calgary, Canada

14:15-14:30 Quantitative imaging for anti-inflammatory gene therapy evaluation in experimental arthritis #6879
Kathryn Stoka, Florence Apparaillib, Danièle Noëlb, Christian Jorgensenbc and Ralph Müllera
a Institute for Biomedical Engineering, Univ. and ETH Zürich, Zürich, Switzerland; b Inserm U475, Univ. Montpellier I, Montpellier, France; c Unité Clinique d'Immunorhumatologie, CHU Lapeyronie, Montpellier, France

14:30-14:45 Comparison of ultrasonic axial transmission and pQCT parameters to bone mechanical properties in vitro #7442
M. Mullera, P. Moilanenc, M. Bosisioab, D. Mittonb, M. Talmant, J. Timonen, S. Cheng, W. Skalli, P. Laugier, a Laboratoire d'Imagerie Paramétrique, CNRS, Université Paris 6, Paris, France; b Laboratoire de Biomécanique, CNRS, ENSAM, Paris, France; c Dept. of Physics and Dept of Health Sciences, Univ. of Jyväskylä, Jyväskylä, Finland

14:45-15:00 Mechanical properties of Cartilage under load determined using Small angle X-ray diffraction (SAXS) and Raman micro-spectrometry #5572
J. Moger*, P. Bleuet*, R. Barrettb, R.E. Ellis*, K.M. Knapp* and C.P. Winlove*
a Univ. of Exeter, School of Physics, Stocker Road, Devon, UK; b European Synchrotron Radiation Facility, Grenoble, France

15:00-15:15 In vivo measurement of anisotropic elasticity of skeletal muscles with MR-Elastography #5518
Yu-Bong KANGa, Takenori OIDAa, Atsushi FUKUMAA, Takashi AZUMAA, Jun OKAMOTOb, Osamu TAKIZAWAA, Tetsuya MATSUDAa, Sadami TSUTSUMIA
a Institute for Frontier Medical Sciences, Kyoto Univ., Kyoto, Japan; b Graduate School of Informatics, Kyoto Univ., Kyoto, Japan; c Siemens-Ashahi Medical Technologies Ltd., Tokyo, Japan

15:15-15:30 Imaging articular cartilage using non-linear microscopy #6291
Jessica Mansfield, C Peter Winlove, Karen Knapp, Steve Matcher; School of Physics, Univ. of Exeter, UK

Scientific Program
Thursday, Aug 3, 2006

08:15-09:45

1. Bone Mechanics – Joint ESB Track

1.1 Bone Tissue

Chairs: Ralph Mueller, John Currey

Thursday, August 3
Room R0.055
Mechanics of Bone Tissue Revisited from Nano to Macro #7815
Philippe Zysset, Vienna Univ. of Technology, Institute for Lightweight Design and Structural Biomechanics, Wien, Austria

Microcrack Growth in Cortical Bone using Indentation Fracture #5250
Liam P. Mullins, Mark S. Bruzzi, Peter E. McHugh; Dept. of Mechanical and Biomedical Engineering, National Univ. of Ireland, Galway; National Centre of Biomedical Engineering Science, National Univ. of Ireland, Galway.

Bone microcrack initiation and propagation – towards nano-tomographic imaging using synchrotron light #5736
Romain Voide, G. Harry van Lenthe, Philipp Schneider, Peter Wyss, Urs Sennhauser, Marco Stampanoni, Martin Stauber, Ralph Müller; Institute for Biomedical Engineering, Univ. and ETH Zürich, Zürich, Switzerland; Electronics / Metrology Laboratory, EMPA, Dübendorf, Switzerland; Swiss Light Source, Paul Scherrer Institut, Villigen, Switzerland

The fracture process in mineralised tissues visualised by whitening, an indicator of microdamage #4278
Andrew Sedman, John Currey, Peter Zioupos; Dept Biology, Univ. of York, York, UK; Dept Materials and Medical Sciences, Cranfield Univ., Swindon, UK

The development of microdamage as a function of strain rate in human cortical bone #4275
Peter Zioupos, Ulrich Hansen, John Currey; Dept Materials and Medical Sciences, Cranfield Univ., Swindon, UK; Dept Mechanical Engineering, Imperial College, London, UK; Dept Biology, Univ. of York, York, UK

Musculoskeletal Mechanics-Joint ISB Track

On the elastic and viscoelastic properties of passive muscle tissue in compression #5846
M. Van Loocke, C.K. Simms, C.G. Lyons
Trinity Centre for Bioengineering, Trinity College Dublin, Ireland

Characterization of muscle belly elastic properties during passive stretching using transient elastography #5837
Antoine Nordez, Christophe Cornu, Pascal Casari, Stefan Catheline
6Laboratoire “Motricité, Interactions, Performance”, JE 2438, UFR STAPS, Université de Nantes, France; 5GeM - Institut de Recherche en Génie Civil et Mécanique, UMR CNRS 6183, Université de Nantes, France; 3Laboratoire Ondes et Acoustique, UMR CNRS 7587, ESPCI, Université Paris VII, Paris, France

Thigh muscle stiffness in hyperthyroid patients before and after medical treatment using magnetic resonance elastography #4605
Sabine Bensamoun, Stacie Ringleb, Qingshan Chen, Michael Brennan, Richard Ehman, Kai-Nan An; Laboratoire de Biomécanique et Génie Biomédical, CNRS UMR 6600, UTC, Compiègne, France; 5Biomechanics Laboratory, Division of Orthopedic Research, Mayo Clinic College of Medicine, Rochester, MN, USA; 3Division of Endocrinology, Endocrine Research Unit, Mayo Clinic, College of Medicine, Rochester, MN, USA; 4Dept. of Radiology, Mayo Clinic College of Medicine, Rochester, MN, USA

Rapid magnetic resonance elastography of skeletal muscle using one dimensional projection #4631
Sabine Bensamoun, Kevin Glaser, Qingshan Chen, Stacie Ringleb, Richard Ehman, Kai-Nan An; Laboratoire de Biomécanique et Génie Biomédical, UTC Compiègne, France; Dept of Radiology, Mayo Clinic, Rochester, MN; Orthopedics Biomechanics Laboratory, Mayo Clinic, Rochester, MN, USA

Relationships among Muscle Deformation, Electromyography and Torque Generated by Normal Upper Arm Muscles during Isometric Contraction #5410
Y.P. Zheng, J. Shi, Q.H. Huang; Dept. of Health Technology and Informatics, The Hong Kong Polytechnic Univ., Hong Kong; School of Communication and Information Engineering, Shanghai Univ., Shanghai, China
09:30-09:45  Human muscle fascicle behaviour during stair negotiation #4969
Spanjaard, M.\textsuperscript{a,}\textsuperscript{b}, Reeves, N.D.\textsuperscript{a}, van Dieën, J.H.\textsuperscript{b}, Baltzopoulos, V.\textsuperscript{a} and Maganaris, C.N.\textsuperscript{a}
\textsuperscript{a} Institute for Biophysical and Clinical Research into Human Movement, Manchester Metropolitan Univ., Alsager, United Kingdom; \textsuperscript{b} Institute for Fundamental and Clinical Human Movement Sciences, Vrije Universiteit, Amsterdam, The Netherlands

2 Musculoskeletal Mechanics-Joint ISB Track
2.7.8 Musculoskeletal Modelling (Theoretical Techniques in biomechanics)
Thursday, August 3
Chairs: Michael Schwartz, Sian Lawson
Room R0.002

08:15-08:30  Overcoming marker occlusion using the Procrustes method #5205
Adam Rozumalski\textsuperscript{a}, Michael H. Schwartz\textsuperscript{ab}, Krista Evans\textsuperscript{ab}; \textsuperscript{a} Gillette Children’s Specialty Healthcare, St Paul, USA; \textsuperscript{b} Univ. of Minnesota, Minneapolis, USA

08:30-08:45  Visualization and quantification of wobbling mass motion – A direct non-invasive method #6061
Valentin Keppler\textsuperscript{ab}, Michael Günther \textsuperscript{ac}; \textsuperscript{a} Theoretische Astrophysik, AG Biomechanik, Universität Tübingen, Germany \textsuperscript{b} Sportwissenschaft, Universität Koblenz, Germany \textsuperscript{c} Orthopädische Klinik, Universität Tübingen, Germany

08:45-09:00  Global optimization method for spherical and cylindrical wrapping in musculoskeletal modeling # 4046
A. Audenaert \textsuperscript{a}, E. Audenaert \textsuperscript{b}; \textsuperscript{a}Dept. of Environment, Technology and Technology Management, UFSIA-UA, Antwerpen, Belgium.; \textsuperscript{b}Dept. of Orthopedic Surgery, Physical Medicine and Rehabilitation, Ghent Univ. Hospital, Ghent, Belgium

09:00-09:15  Are natural coordinates a useful tool in modeling planar biomechanical linkages? #4625
Adam Czaplicki; Academy of Physical Education in Warsaw, External Faculty of Physical Education in Biala Podlaska, Dept. of Biomechanics, Poland

09:15-09:30  Criteria for optimality in movements #5621
Anders Eriksson; KTH Mechanics, Stockholm, Sweden

09:30-09:45  Pot bellies and motion analysis: development and validation of a novel lower limb model for use in centrally obese patients #5045
Bharti Rajput, Weijie Wang, Sheila Gibbs, Lynda Cochrane, Graham Arnold, Rami Abboud
Institute of Motion Analysis & Research (IMAR), Univ. of Dundee, Scotland, UK

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.2.4 Falls
Session Organizer/Chair: Jaap van Dieën
Thursday, August 3
Room R1.046

08:15-08:30  Soft shell hip protectors absorb energy and shunt impact force away from the trochanter during a fall #4136
Andrew C. Laing, Stephen N. Robinovitch; School of Kinesiology, Simon Fraser Univ., Burnaby, Canada

08:30-08:45  Medial Knee Osteoarthritis Alters Gait Patterns in Older Adults When Crossing Obstacles of Different Heights with the Leading Limb #4677
Hao-Ling Chen, Tung-Wu Lu, Yen-Hung Liu and Ting-Ming Wang; Institute of Biomedical Engineering, National Taiwan Univ., Taipei, Taiwan

08:45-09:00  Coordination and Gait Initiation in Multiple Sclerosis #6076
Jebb G. Remelius, Richard E.A. Van Emmerik, Joe Hamill; Exercise Science, Univ. of Massachsetts, Amherst U.S.A

09:00-09:15  Simulation of weight transfer onto a laterally-compliant raised structure: effects of movement strategy and delay in sensory feedback on system stability #4224
Bing-Shiang Yang\textsuperscript{ab}, James A. Ashton-Miller\textsuperscript{a}; \textsuperscript{a} Sensory Motor Performance Program, Rehabilitation Institute of Chicago, USA; \textsuperscript{b} Dept. of Mechanical Engineering, Univ. of Michigan, USA

09:15-09:30  Influence of lower limb proprioceptive cues on the detection threshold of the direction of postural movement# 5341

Yongwoo Yi, Sukyung Park; Mechanical Engineering Dept, Korea Advanced Institute of Science and Technology, Taejon, Korea

09:30-09:45 Classification of gait patterns using kinematic, kinetic and acceleration variables #5272
Yue Li, Rachid Aissaoui, Katia Turcot, Karine Boivin, Nicola Hagemeister, Jacques A. de Guise; Imaging and Orthopaedics Research Laboratory, École de technologie supérieure, Montreal, Quebec, Canada

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.5.4 Walking Dynamics
Session Organizers: Dieter Rosenbaum, Fabio Catani
Chairs: Dieter Rosenbaum
Thursday, August 3
Room R0.005

08:15-08:30 Biomechanics and the diabetic foot: a novel approach to measurement #5043
Bharti Rajput a, Graham Arnolda, Sheila Gibbsa, Weijiwang, Lynda Cochranea, Graham Leeseb, Rami Abboudc; aInstitute of Motion Analysis & Research (IMAR), Univ. of Dundee, Scotland, UK.; bTayside Univ. Hospital NHS Trust, Dundee, Scotland, UK.

08:30-08:45 Plantar Pressure Distribution Differences Between Flat And Normal Feet In Healthy Subjects #4820
Tatiana A. Bacarin, Maíra G. Canettieri, Paula M.H. Akashi, Isabel C.N. Sacco
Lab. of Biomechanics of the Movement and Human Posture – Dept. of Physical Therapy - Univ. of São Paulo – São Paulo – Brazil

08:45-09:00 Coactivation Of Distal Muscles In Neuropathic Diabetic Patients During Gait #4813
Paula M H Akashi a, Ricky Watari b, Eneida Y Suda a, Isabel C N Sacco a
aLab. Biomechanics of Human Movement and Posture, Physical Therapy, Speech and Occupational Therapy Dept., School of Medicine, Univ. of São Paulo – São Paulo – Brazil.

09:00-09:15 Functional instability of the ankle joint is associated with changes in neuromuscular control and joint movement during walking #4717
Eamonn Delahunt a, Kenneth Monaghan a, Brian Caulfield a, School of Physiotherapy and Performance Science, Univ. College Dublin, Dublin, Republic of Ireland

09:15-09:30 Simulation of gait dynamics in above-knee prostheses #5989
Shabnam Pejhan, Farzam Farahmand, Mohammad Parnianpour; Mechanical Engineering School, Sharif Univ. of technology, Tehran, Iran

09:30-09:45 Pattern analysis of kinematic and kinetic characteristics of the lower limb during walking for patients with cerebral palsy #4497
Doraisamy Manivelavan, Weijie Wang, Sheila Gibbs, Rami Abboud
Institute of Motion Analysis and Research, Univ. of Dundee, Dundee, United Kingdom

4. Implants for Trauma and Orthopedics-Joint ESB Track
4.8.1 Biotribology: Invited Presentations
Chair: John Fisher
Thursday, Aug. 3
Room E1.03

08:15-08:30 Reduction of osteolysis with crosslinked polyethylene: five year in vivo results #7185
Bitsch R.G. a, Heisel C.a, Ball S.b, Schmalzried T.P.b, a Univ. of Heidelberg, Germany; b Joint Replacement Institute, Los Angeles, USA

08:30-08:45 Effects of implant design parameters on fluid ingress during THA impingement/subluxation #3462
Hannah J. Lundberg a, Douglas R. Pedersen a, John J. Callaghan a, Thomas D. Brown a
aDept. of Orthopaedics and Rehabilitation, Univ. of Iowa, Iowa City, IA, USA; aDept. of Biomedical Engineering, Univ. of Iowa, Iowa City, IA, USA
08:45-09:00  Comparison of Numerical and Experimental Total Knee Replacement Wear Simulation #5140
L. A. Knight, J. Fisher, P. Rullkoetter and M. Taylor. Bioengineering Sciences Research Group, Univ. of Southampton, Southampton, UK; Institute of Medical and Biological Engineering, Univ. of Leeds, Leeds, UK; Dept. of Engineering, Univ. of Denver, Denver, CO, USA

09:00-09:15  Metal-on-Metal Hip Implants #7891
C.B. Rieker, P. Köttig, M. Shen, J. Krevolin; Zimmer Switzerland

09:15-09:30  Friction and lubrication modelling of metal-on-metal artificial hip joints #5396
Fengcai Wang, Claire Brockett, Sophie Williams, Zhongmin Jin, John Fisher
Institute of Medical and Biological Engineering, Univ. of Leeds, UK

09:30-09:45  Differences in Wear Mechanisms between Main Contact Areas and Stripe Wear Regions in Metal-on-Metal Hip Joints #4091
Alfons Fischer, Markus A. Wimmer; Univ. of Duisburg-Essen, Duisburg, Germany; Rush Univ. Medical Center, Chicago, USA

5. Occupational and Impact Injury Biomechanics
5.6.1 Abdominal Injury Biomechanics
Session Organizers /Chairs: Warren Hardy, Ali Elhagediab
Thursday, August 3
Room R0.058

08:15-08:45  Abdominal Impact Injury Research: A Review #5873
Stephen W. Rouhana; Ford Motor Company, Dearborn, Michigan, U.S.A.

08:45-09:00  Identifying Abdominal Injury Patterns Using the NASS and CIREN Databases #7238
Kathleen D. Klinich, Carol A. C. Flannagan, Kristen J. Nicholson, Lawrence W. Schneider, Jonathan D. Rupp; Univ. of Michigan Transportation Research Institute, Univ. of Michigan Dept. of Biomedical Engineering, Ann Arbor, MI, USA

09:00-09:15  Advancements in the Rate-Sensitive Abdomen for the Hybrid III Family of Dummies #5962

09:15-09:30  High-Speed Seatbelt Loading of the Cadaver Abdomen #5251
Craig D. Foster, King H. Yang, Syuzo Hashimoto, Warren N. Hardy; Bioengineering Center, Wayne State Univ., Detroit, MI, USA; Vehicle Safety, Toyota Motor Corporation, Higasifumi Technical Center, Shizuoka, Japan

09:30-09:45  Mechanical properties of kidney and liver tissues in shear #5065
Nicolle, S., Vezina, P. and Palierne JF.; Laboratoire de Biomécanique et de Modélisation Humaine, INRETS, Bron, France; Laboratoire de Physique, ENS, Lyon, France

6. Sport Biomechanics-Joint ISB Track
6.4.2 Nordic Walking
Session Organizers: Hermann Schwameder, Th. Jöllenbeck
Thursday, August 3
Room D2.12

08:15-08:30  Knee joint loading and metabolic energy demand in walking, Nordic walking and running # 7795
Hermann Schwameder, Susanne Ring, Dept Sport Science & Kinesiology, Univ. of Salzburg, Austria

08:30-08:45  Lower extremity joint loading in level and graded walking #7794
Hermann Schwameder, Dept Sport Science & Kinesiology, Univ. of Salzburg, Austria

08:45-09:00  Nordic walking versus walking – Field testing to determine biomechanical loading of the lower limb # 7812
Thomas Jöllenbeck, Christian Grüneberg, Daniel Leyser, Melanie Mull, Claudia Classen; Institute of Biomechanics, Klinik Lindenplatz, Bad Sassendorf, Germany; Faculty of Health, Univ. of Applied Sciences - Europa Fachhochschule Fresenius, Idstein, Germany
09:00-09:15  Experimental comparison of the knee joint loading during Nordic Walking and Walking  
#6923  
A. Franz\textsuperscript{a}, T. Esser\textsuperscript{a}, S. Lücke\textsuperscript{a}, R. Roth\textsuperscript{b}, G.P. Brüggemann\textsuperscript{a}; \textsuperscript{a} Institute of Biomechanics and Orthopaedics, German Sport Univ. Cologne, Germany; \textsuperscript{b} Institute of Outdoor Sports and Environment, German Sport Univ. Cologne, Germany

09:15-09:30  Field testing to determine biomechanical loading of the lower limb during nordic walking versus walking-Comparison between nordic walking instructors and experienced nordic walkers #7852  
Christian Grüneberg\textsuperscript{a}, Thomas Jöllenbeck\textsuperscript{b}, Daniel Leyser\textsuperscript{a}, Melanie Mull\textsuperscript{b}, Claudia Classen\textsuperscript{b}; \textsuperscript{a}Faculty of Health, Univ. of Applied Sciences - Europa Fachhochschule Fresenius, Idstein, Germany; \textsuperscript{b} Institute of Biomechanics, Klinik Lindenplatz, Bad Sassendorf, Germany

09:30-09:45  Biomechanical Analysis of the Nordic Walking-Technique #7863  
Burger Ronald; Katrin Schwaben; Jan Fischer, Institute of Sports Science, Johannes Gutenberg-Univ., Mainz, Germany

7. Dental Biomechanics

Track Coordinators: Arturo Natali, Jos Vander Sloten

7.1 Dental Implant Mechanics- Bone Implant Interaction Phenomena

Session Organizers /Chairs: Jos Vander Sloten, John Brunski

Thursday, August 3

Room R1.006

08:15-08:30  The influence of abutment angulation on immediate loaded dental implants- A 3D finite element analysis #4658  
Hung-Chan Kao\textsuperscript{ab}, Chen-Sheng Chen\textsuperscript{c}, Tai-Foong Chung\textsuperscript{d}, Cheng-Kung Cheng\textsuperscript{b}, Ming-Lun Hsu\textsuperscript{b}; \textsuperscript{a} Biomechanics Research Lab, Medical Research Depart, Mackay Memorial Hospital, Taipei, Taiwan; \textsuperscript{b} Institute of Biomedical Engineering, National Yang-Ming Univ., Taipei, Taiwan; \textsuperscript{c} Institute of Rehabilitation Science & Technology, National Yang-Ming Univ., Taipei, Taiwan; \textsuperscript{d} Dental School, National Yang-Ming Univ., Taipei, Taiwan

08:30-08:45  Experimental and numerical analysis of the mobility of immediately loaded dental implants using a pig model #5027  
Alireza Rahimi\textsuperscript{a}, Christoph Bourneau\textsuperscript{b}, Marcus Abboud\textsuperscript{a}, Gerhard Wahl\textsuperscript{c}, Dennis Giantoro\textsuperscript{b}, Susanne Reimann\textsuperscript{b}, Ludger Keilig\textsuperscript{c}; \textsuperscript{a} Dept. of Oral Surgery, \textsuperscript{b} Dept. of Orthodontics and \textsuperscript{c} Dept. of Preclinical Education and Dental Research, Dental School, Univ. of Bonn, Bonn, Germany

08:45-09:00  Loading characteristics of restorations supported by dental implants #5417  
M. Karl\textsuperscript{a}, W. Winter\textsuperscript{b}, M.G. Wichmann\textsuperscript{a}, S.M. Heckmann\textsuperscript{a}; \textsuperscript{a} Dept. of Prosthodontics and b Institute of Applied Mechanics, Univ. of Erlangen-Nuremberg, Erlangen, Germany

09:00-09:15  Mechanobiology at healing bone-implant interfaces: strain distribution and tissue response #7119  
John Brunski\textsuperscript{a}, Jennifer Currey\textsuperscript{a}, Jill A. Helms\textsuperscript{a}, Philipp Leucht\textsuperscript{a}, Antonio Nanci\textsuperscript{b}, Dan Nicolette\textsuperscript{a}, Rima Wazen\textsuperscript{a}; \textsuperscript{a} Dept. of Biomedical Engineering, Rensselaer Polytechnic Institute, Troy, NY, USA; \textsuperscript{b} Univ. of Montreal, Montreal, Quebec, Canada; \textsuperscript{c} Children’s Surgical Research Laboratory, Stanford Univ. School of Medicine, Stanford, CA, USA; \textsuperscript{d} Southwest Research Institute, San Antonio, TX, USA

09:15-09:30  Personalised FE modelling of the mandible and the prosthetic-implant complex to estimate a bone strain warning threshold for an oral rehabilitation “smart” prosthesis # 7444  
L. Muraru\textsuperscript{a}, S.V.N. Jaecques\textsuperscript{a}, C. Van Lierde\textsuperscript{c}, E. De Smet\textsuperscript{b}, I. Naert\textsuperscript{b}, J. Vander Sloten\textsuperscript{a}; \textsuperscript{a} K.U.Leuven, Division of Biomechanics and Engineering Design, Leuven, Belgium; \textsuperscript{b} K.U.Leuven, Dept. of Prosthetic Dentistry, BIOMAT Research Group, Leuven, Belgium; \textsuperscript{c} Materialise NV, Haasrode, Belgium

09:30-09:45  Mechanical properties and shock absorption of dental implants equipped with abutments made of composite materials #5855  
M.Camposaragna\textsuperscript{a}, F.Casolo\textsuperscript{b}, M.Cocetta\textsuperscript{a}, G.Maraschi\textsuperscript{b}, G.Vrespa\textsuperscript{a}; \textsuperscript{a} Dept. Electrical Engineering, Man-machine Systems Mechanics Unit, Politecnico di Milano, Italy
\textsuperscript{b} Primary Healing Implant, Milan, Italy
8. Computer-Assisted Surgery

Track Coordinators: Rainer Burgkart, Lutz Nolte, Klaus Radermacher

8.1 Surgical Planning, Modeling and Simulation

Session Organizers /Chairs: Georg Duda, Stephen Ferguson

Thursday, August 3

Room R1.003

08:15-08:30  Maxillo-facial surgery simulation with a simple patient specific material model #5090
Jens Georg Schmidt, Guntram Berti, Thomas Hierl, C&C Research Labs, NEC Europe Ltd., Sankt Augustin, Germany; Univ. Clinics, Leipzig, Germany

08:30-08:45  Investigation of the Gravity-Induced Brain Shift using a Three-Dimensional FE Model of the Human Brain #7011
Jong B. Lee, Jingwen Hu, Vinip Chaudhary and King H. Yang, Albert I. King
Bioengineering Center, Wayne State Univ., Detroit, MI, USA; Institute for Scientific Computing, Wayne State Univ., Detroit, MI, USA

08:45-09:00  The influence of sex in the construction of a statistical atlas of the hemi-pelvis #7511
Patricia Murtha, Chenyu Wu, Andrew B. Mor, Branišlav Jaramaz, Institute for Computer Assisted Orthopaedic Surgery, The Western Pennsylvania Hospital, Pittsburgh, USA; The Robotics Institute, Carnegie Mellon Univ., Pittsburgh, Pennsylvania, USA

09:00-09:15  Computational Simulation Slit Arteriotomy for End-to-side Arterial Anastomosis in Microsurgery #4670
Zi Liu, C Lu, KY Lam, AWC Chua, BK Tan; Institute of High Performance Computing, Singapore; School of Mechanical and Aerospace Engineering, Nanyang Technological Univ., Singapore; Dept. of Plastic Surgery, Singapore General Hospital, Singapore

09:15-09:30  Patient-specific modeling: predicting outcomes of cardiovascular interventions #7595
C. A. Taylor; Depts of Bioengineering and Surgery, Stanford Univ., Stanford, CA, USA

09:30-09:45  Importance of respiration and graft compliance in Fontan circulations: Experimental and computational studies #6067
Carol Lucas, Mark Ketter, Brooke Steele, Michael R. Mill, Brett Sheridan, Warner J. Lucas, Kerem Pekkan, Ajit Yoganathan, The Univ. of North Carolina, Chapel Hill, North Carolina, USA; Georgia Institute of Technology, Atlanta, Georgia, USA

9. Tissue Engineering

9.2 Cartilage–Meniscus Tissue Engineering

Session Organizers: Alan Grodzinsky, Dan Bader

Thursday, August 3

Room R1.004

08:15-08:30  Effects of cyclic compression on ECM synthesis and mechanical property in cultured chondrocyte-agarose construct #5650
Yoshinori Sawae, Akihiro Hanaki, Emiko Suzuki, Teruo Murakami; Faculty of Engineering, Kyushu Univ., Fukuoka, Japan

08:30-08:45  Dynamic compression of IL-1β stimulated chondrocyte-agarose constructs influences the release of NO and PGE2 via MAPK pathways #5662
Tia Chowdhury, David Lee and Dan Bader; Medical Engineering Division, Dept of Engineering, Queen Mary Univ. of London, London, UK

08:45-09:00  Influence of cell density on dedifferentiated chondrocytes in alginate bead culture under mechanical stimulation #7637
Y Wang, N. de Isla, C. Gigant-Huselstein, S. Muller, B.H. Wang, J.F. Stoltz; Mécanique et Ingénierie Cellulaire et Tissulaire, UMR-CNRS-INPL 7563 LEMTA et IFR111, Faculté de Médecine, Vandoeuvre-lès-Nancy, France; Dept. of Biochemistry and Molecular Biology, School of Medicine, Wuhan Univ., Wuhan, China

09:00-09:15  Mechanical properties of synovial cell-seeded 3-D constructs for cartilage regeneration: Effects of cyclic compressive stress #6880
D. Katakai, H. Fujie, M. Nakata; Biomechanics Laboratory, Kogakuin Univ., Tokyo, Japan; Dept. of Orthopaedic Surgery, Osaka Univ. Medical School, Osaka, Japan

09:15-09:30  Low Intensity Pulsed Ultrasound does not stimulate cartilage matrix synthesis in 3D agarose constructs #5638
10. Cellular and Molecular Mechanics

10.5.1 Mechanotransduction

Session Organizers: Mohammad Kaazempur-Mofrad, Brian Helmke

Thursday, August 3

Room R0.056

08:15-08:30 Biomechanical Properties and Roles of Stress Fibers in Mechanotransduction #6381
Masaaki Sato, Shinji Deguchi\textsuperscript{a,b}, Tsubasa Matsui\textsuperscript{a} and Toshiro Ohashi\textsuperscript{a}
\textsuperscript{a}Dept. of Bioengineering and Robotics, Tohoku Univ., Sendai, Japan; \textsuperscript{b}Division of Industrial Innovation Sciences, Okayama Univ., Okayama, Japan

08:30-08:45 Mechanotransmission through the cytoskeleton and focal adhesion sites guides flow-induced extracellular matrix remodeling #6929
Rosalind E. Mott and Brian P. Helmke; Univ. of Virginia, Charlottesville, Virginia, USA

08:45-09:00 Force-Induced Activation of Talin: Its Role in Focal Adhesion Development #7476
Seung E. Lee\textsuperscript{a}, Mohammad R. Kaazempur-Mofrad\textsuperscript{a}, Roger D. Kamm\textsuperscript{a}
\textsuperscript{a}MIT, Cambridge, USA; \textsuperscript{b}Univ. of California, Berkeley, USA

09:00-09:15 Focal adhesion kinase (pp125 FAK) phosphorylation is linked to force generation in F9 cells #5159
Anna H. Klemm, Daniel Paranhos Zitterbart, Wolfgang H. Goldmann; Friedrich-Alexander-Univ. of Erlangen-Nuremberg; Center for Medical Physics and Technology, Biophysics Group, Erlangen, Germany

09:15-09:30 A model for the role of integrins in flow induced mechanotransduction in osteocytes #5349
Yilin Wang \textsuperscript{a}, Mitchell Schaffler \textsuperscript{b}, Sheldon Weinbaum\textsuperscript{a}; \textsuperscript{a}Dept. of Biomedical Engineering, CUNY Graduate Center and the City College of New York, NY, USA; \textsuperscript{b}Dept. of Orthopedics, Mount Sinai School of Medicine, New York, NY, USA

09:30-09:45 Mechanotransduction: models how extracellular matrix proteins and integrins convert force into biochemical signals #6110
Viola Vogel; Laboratory for Biologically Oriented Materials, Dept. of Materials, ETH Zurich, Switzerland

11. Artificial Organs

11.2.2 Cardiac Assist Devices and Modelling

Session Organizers: Keith Sharp, Klaus Affeld

Thursday, August 3

Room R1.002

16:00-16:15 Current and Emerging Blood Pumping Systems: Opportunities for Modeling Techniques #7266
George Pantalos; Cardiovascular Innovation Institute, Univ. of Louisville, Louisville, Kentucky, USA

16:15-16:30 Frequently asked questions on evaluation of blood trauma #4455
Kameneva MV; Univ. of Pittsburgh, Pittsburgh, USA

16:30-17:00 Numerical modelling of blood traumatization: An overview #6258
Hormes M, Steinseifer U, Schmitz-Rode T; Helmholtz-Institute of Biomedical Engineering, Chair of Applied Medical Engineering, Univ. Aachen, Germany

17:00-17:15 The Penn State Pediatric Ventricular Assist Device: The Impact of Pediatric Hemorheological Properties on PIV Measurements # 6038
Keeffe B. Manning, Brandon D. Wivholm, Jennifer A. Long, Arnold A. Fontaine, Steven Deutsch; Dept. of Bioengineering, The Pennsylvania State Univ., Univ. Park, PA, U.S.A.
17:15-17:30 Effect of gap size on haemolysis in a continuous flow, axial, ventricular assistance device using Smoothed Particle Hydrodynamics #5594
Matt Sinnott a, Paul Cleary a and Mahesh Prakash a ; aCSIRO Mathematical and Information Sciences, Melbourne, Australia

12. Biomaterials
12.2 Smart Biomaterials
Session Organizers /Chairs: Joerg Vienken, Birgit Glasmacher
Thursday, August 3
Room R1.001
08:15-08:30 How to improve blood compatibility of dialysis membranes? #7375
Joerg Vienken a and Michael Diamantoglu b, a Fresenius Medical Care, Bad Homburg, Germany; b Erlenbach, Germany
08:30-08:45 Investigation of the influence of ordered symmetrical nanostructures on thrombocyte adhesion #6528
Andreas Szentivanyi a, Boris Chichkov b, Birgit Glasmacher c; a Helmholtz Institute for Biomedical Engineering, Univ. Aachen, Aachen, Germany; c Laser Zentrum Hannover LHZ, Univ. Hannover, Hannover, Germany
08:45-09:00 Latest imaging performance tests in CT and MR scanners to detect In-Stent Restenosis #5393
Torsten Scheuermann a, Michael Kühling a, Dominique Seidel a, Peter Albrecht a, Thomas Voigtländer a, Axel Schmermund b, Jörg Barkhausen c, Thomas Schlosser a, b, Stefan Ulzheimer d, Luc Minville e, Louise Allard f, Guy Cloutier g, Gilles Soulez h; a Dept. of Diagnostic and Interventional Radiology, Univ. of Essen, Germany; b Cardiovascular Center Bethanien (CCB), Frankfurt, Germany; c Dept. of Diagnostic and Interventional Radiology, Univ. of Essen, Germany; d Cardiovascular Center Bethanien (CCB), Frankfurt, Germany; e Dept. of Diagnostic and Interventional Radiology, Univ. of Essen, Germany; f Dept. of Diagnostic and Interventional Radiology, Univ. of Essen, Germany; g Dept. of Diagnostic and Interventional Radiology, Univ. of Essen, Germany; h Dept. of Diagnostic and Interventional Radiology, Univ. of Essen, Germany
09:00-09:15 Controlled dynamic cultivation of 3D collagen scaffolds in a perfusion bioreactor setup to improve cellular growth #6532
I. Bernemann a, M. Kuberka a, M. Neis b, G. Rau b, B. Glasmacher c; a Cryobiology & Biomaterials, RWTH Aachen Univ., Aachen, Germany; b Dermatology, Univ. Hospital Aachen, Germany
09:15-09:30 Mopved to Poster Session
09:30-09:45 Direct-to-Bone Fixation of Ceramic Implants #6927
Meinhard Kuntz, Matthias Grüssel, Patricie Merkert; CeramTec AG, Plochingen, Germany

14. Cardiovascular Mechanics
14.2.1 Cardiac Mechanics and Biology
Session Organizers /Chairs: Motoaki Sugawara, Justin Davies
Thursday, August 3
Room G1.27
08:15-08:30 Differences in the reflection of pulse wave in the carotid artery between hypertensive and normotensive subjects #6795
Motoaki Sugawara a, Kiyomi Niki b, Takashi Okada c, Akimitsu Harada c; a Himeji Dokkyo Univ., Himeji, Japan; b Tokyo Women’s Medical Univ., Tokyo, Japan; c Research Laboratory, Aloka Co. Ltd, Tokyo, Japan
08:30-08:45 Finite element simulations of the cardiac cycle - comparisons with measured myocardial velocities #6505
Espen W. Remme a, b, Erik Lyseggan a, Martyn P. Nash b, Otto A. Smiseth b; a Dept. of Cardiology, Rikshospitalet Univ. Hospital, Oslo, Norway; b School of Engineering, Univ. of Auckland, Auckland, New Zealand
08:45-09:00 Cardiovascular rhythms and heart rate chaos #4552
Lin-Lin SHEN a, Da-Kan TANG b, Da-An ZHENG d, Chi-Sang Poon d, Guo-Qiang WU b; a Dept. of Physiology, b Dept. of Mechanics, School of Information Science and Engineering, Fudan Univ., Shanghai, China; d Harvard-MIT Division of Health Sciences and Technology, MIT, MA, USA
09:00-09:15 Cardiac function in growth hormone receptor knockout mice #7180
Anilkumar K. Reddy, Craig J. Hartley, Fawzia Huq, Thuy T. Pham, Daniel Amador-Noguez, Mark L. Entman, Gretchen J. Darlington, and George E. Taffet

Dept. of Medicine, Huffington Center on Aging, Baylor College of Medicine, Houston, Texas, USA

09:15-09:30 Cellular cardiomyoplasty using embryonic cardiomyocytes and adult stem cells #7312
Wilhelm Roell, Martin Breitbach, Toktam Hashemi, Oliver Dewald, Armin Welz, Bernd K. Fleischmann; Dept. of Cardiac Surgery, Univ. of Bonn, Germany; Institute of Physiology I, Univ. of Bonn, Germany

09:30-09:45 Intercalated discs create and dispose sarcomeres -An observation of volume overloaded and/or overload-removed rabbit hearts #5540
Hirotake Masuda, Makoto Yoshida, Koichi Kawamura, Mikio Kobayashi, Masato Takahashi, Hiroshi Nanjo, Iketsu Sho, Masayo Komatsu, Makiko Honma; Dept. of Pathology and Immunology, Akita University School of Medicine, Akita, Japan; Clinical Pathology, Akita University School of Medicine, Akita, Japan; Vascular Surgery, Stanford Univ. School of Medicine, Stanford, CA, USA; Clinical Pathology, Yamamoto-Kumiai General Hospita, Noshiro, Japan

14. Cardiovascular Mechanics
14.6.4 Computational Modelling
Session Organizers /Chairs: David Steinmann
(Incorporating presentations from Thread 1 Computational Methods in Biomechanics and Mechanobiology Thread organizers: Gerhard A. Holzapfel, Tim David)

Thursday, August 3
Room R0.006
08:15-08:30 Computational simulation of blood flow in the human left ventricle #7027
W. Schiller, T. Schmidt, K. Spiegel, S. Donisi, C. Probst, A. Kovacev, S. Flack, D. Liebsch, H. Oertel; Klinik und Poliklinik für Herzchirurgie, Universität Bonn, Germany; Institut für Strömungslehre, Universität Karlsruhe, Germany; Lehrstuhl für Strömungsmechanik, Fachhochschule München, Germany; Radiologische Klinik, Universität Bonn, Germany

08:45-09:00 Comparison of Measured and Simulated Deformation of a Left Ventricle #4726
Matthias B. Mohr, Gunnar Seemann, Frank B. Sachse, Bernd Jung, Olaf Dössel; Institute of Biomedical Engineering, Universität Karlsruhe (TH), Germany; Nora Eccles Harrison Cardiovascular Research and Training Institute, Univ. of Utah, USA; Univ. Hospital Freiburg, Dept. of Diagnostic Radiology - Medical Physics, Freiburg, Germany

09:00-09:15 Hemorheological properties effects on wall shear stress computation: analysis for intrastent flow #5052
Nicolas Bénard, Robert Perrault, Damien Coisne; Laboratoire d’Études Aérodynamiques, Poitiers, France; Univ. Hospital La milétrie, Cardiology unit, Poitiers, France

09:15-09:30 Finite element simulation of the free expansion of the Cypher stent cramped on a tri-folded balloon #6912
Matthieu De Beule, Peter Mortier, Patrick Segers, Stéphane G. Carlier, Benedict Verhegghé, Rudy Van Impe, Pascal Verdonck; Laboratory for Research on Structural Models, Ghent Univ., Belgium; Cardiovascular Mechanics and BioFluid Dynamics research Unit, Institute Biomedical Technology, Ghent Univ., Belgium; Colomba Univ. Medical Center, New York, USA; Dept. of Mechanical Construction and Production, Ghent Univ., Belgium

14. Cardiovascular Mechanics
14.11.3 Mechanobiology of Vascular Walls and Cells
Session Organizers /Chairs: Masaaki Sato, Mort Friedman
Thursday, August 3
Room G0.01
08:15-08:30 Oxidative responses of two endothelial cell types to cyclic strain #6633
Hak-Joon Sung, Andrew Yee, Suzanne G. Eskin and Larry V. McIntire; Wallace Coulter Dept. of Biomedical Engineering, Georgia Institute of Technology and Emory Univ., Atlanta, GA, USA

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08:30-08:45 Selective Differentiation Of Flk-1-Positive Embryonic Stem Cells Into Arterial Endothelial Cells By Fluid Shear Stress #5525
Kimiko Yamamoto, Nobutaka Shimizu, Syotaro Obi, and Joji Ando; Dept. of Biomedical Engineering, Graduate School of Medicine, Univ. of Tokyo, Tokyo, Japan

08:45-09:00 Shear dependence on adhesive force of artificial platelet and mechanical property of von Willebrand factor #5649
Ami Ogata a, Masatoshi Hasumi b, Kenichi Suzuki c, Shihji Takeoka d, Yasuo Ikeda e, Kazuo Tanishita b; a Center for Chemical Biology, Graduate School of Keio Univ., Yokohama, Japan; b Dept. of System Design Engineering, Keio Univ., Yokohama, Japan; c Dept. of Polymer Chemistry, Waseda Univ., Tokyo, Japan; d School of Medicine, Keio Univ., Tokyo, Japan

09:00-09:15 Effect of frequency of cyclic tensile strain on vascular smooth muscle cell alignment #5335
Bo Liu, Ming-Juan Qu, Zhen-Kun Li, He Li, and Zong-Lai Jiang; Institute of Mechanobiology & Medical Engineering, School of Medicine, Shanghai Jiao Tong Univ., Shanghai, China

09:15-09:30 Modeling of rectangular membranes used to subject cells to stress gradients #5521
Daisuke Mori, Guido David, Jay D. Humphrey, and James E. Moore Jr.; Biomedical Engineering Dept., Texas A&M Univ., Texas, USA

09:30-09:45 Effect of hydrostatic pressure on proliferation of the cells of a hybrid vascular graft #4549
Takeshi Karino a, Lei Sun b, Koichi Niva c; a Research Institute for Electronic Science, Hokkaido Univ., Sapporo, Japan; b Dept. of Mechanics, Zhejiang Univ., Hangzhou, China; c Dept. of Food Science and Technology, Tokyo Univ. of Agriculture, Abashiri, Japan

15. Microcirculation
15.6. Microvascular Mechanotransduction
Session Organizers: Geert W. Schmid-Schönbein, Brian Helmke
Thursday, August 3
Room R1.005

08:15-08:30 Unraveling hypertensive transduction cascades in the vasculature #6236
Stephanie Lehoux; Inserm U689, Cardiovascular Research Center Inserm Lariboisiere, Paris, France

08:30-08:45 Shear stress-induced gene response in human microvascular lymphatic endothelial cells #7387
Carolyn Yong a, Eric A. Bridenbaugh b, David C. Zawieja b and Melody A. Swartz c
a Institute of Bioengineering, École Polytechnique Fédérale de Lausanne, Switzerland; b Dept. of Medical Physiology, College of Medicine, Texas A&M Univ. System Health Science Center, College Station, TX, USA

08:45-09:00 G-Protein Coupled Membrane Receptors May Serve as Mechansensors for Fluid Shear Stress in Neutrophils #6503
Ayako Makino, Geert W. Schmid-Schönbein; Dept. of Bioengineering, Univ. of California, San Diego, La Jolla, CA, USA

09:00-09:15 The Role Of Endothelial P2X4 Receptors In Flow-Dependent Control Of Vascular Tone And Remodeling #4304
Joji Ando a, Kimiko Yamamoto a, Takaaki Sokabe b, and Akira Kamiy a
a Dept. of Biomedical Engineering, Graduate School of Medicine, Univ. of Tokyo, Tokyo, Japan; b Interdisciplinary Science Center, Nihon Univ., Tokyo, Japan

09:15-09:30 Matrix stiffness regulates the architecture of microvascular networks: role of cell-cell and cell-substrate interactions #6174
F. J. Byfield a and K.J. Gooch b; a Institute for Medicine and Engineering, Penn, Philadelphia, PA, USA; b Dept. of Biomedical Engineering, Ohio State Univ., Columbus, OH, USA

09:30-09:45 Shear stress dependence of leukocyte rolling interactions on nanopatterned substrates of P-selectin that mimic activated endothelial surfaces #6977
Xiefan Lin, Anthony S. W. Ham, Michael L. Reed, Michael B. Lawrence, and Brian P. Helmke; Univ. of Virginia, Charlottesville, Virginia, USA

17. Biomechanics in Nature
17.5.3 Terrestrial Locomotion
Session Organizers: Andy Biewener, Alan Wilson  
**Thursday, August 3**  
**Room R1.087**

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<tr>
<th>Time</th>
<th>Title</th>
<th>Speakers</th>
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<tr>
<td>08:15-08:30</td>
<td>Walking and running dynamics explained by compliant legs: consequences, general insights, and future directions #7068</td>
<td>Hartmut Geyer(^a,b), Andre Seyfarth(^c); Locomotion Lab, Friedrich-Schiller-Univ. Jena, Germany; (^b)Biomechatronics Group, MIT Media Lab, Massachusetts Institute of Technology, Cambridge, MA, USA</td>
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<tr>
<td>08:30-08:45</td>
<td>Minimising mechanical work in quadrupedal locomotion #6969</td>
<td>Alan Wilson; Structure and Motion Laboratory, The Royal Veterinary College, Hatfield and Structure and Motion Lab, Univ. College London, London, UK</td>
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<tr>
<td>08:45-09:00</td>
<td>Ants running on inclines: path integration and stability #7129</td>
<td>Tobias Seidl(^a), Tom Weihmann(^b), Reinhard Blickhan(^b), Rüdiger Wehner(^a); Dept. Neurobiology, Inst. Zoology, Univ. of Zurich, Switzerland; (^b)Dept. Movement Sciences, Inst. Sports Sciences, FSU Jena, Germany</td>
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<tr>
<td>09:00-09:15</td>
<td>Frictional characteristics of earthworms in response to ground surfaces #7546</td>
<td>H. Fujie, M. Sato, S. Nakajima and K. Motai; Biomechanics Lab, Kogakuin Univ., Tokyo, Japan</td>
</tr>
<tr>
<td>09:15-09:30</td>
<td>Legs operate different during steady locomotion and escape in a wandering spider #5184</td>
<td>Tom Weihmann, Reinhard Blickhan; Dept. of Motion Science, Friedrich Schiller Univ., Jena, Germany</td>
</tr>
<tr>
<td>09:30-09:45</td>
<td>Work modulation in hindlimb joints of goats during vertical climbing #7039</td>
<td>Edwin H. Yoo, David V. Lee, and Andrew A. Biewener; Concord Field Station, Harvard Univ., Cambridge, USA</td>
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**19. Biotransport**  
**19.6 Biothermodynamics and Thermal Property Measurement**  
Session Organizer /Chair: Alptekin Aksan

**Thursday, August 3**  
**Room R0.003**

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<tr>
<th>Time</th>
<th>Title</th>
<th>Speakers</th>
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<tr>
<td>08:15-08:30</td>
<td>Effect of Carbohydrates on Biothermodynamic Properties of Bacteria #7428</td>
<td>Vishard Ragoonanan (^a), Shweta Srikanth (^b), Wim Wolkers (^c), Daniel R. Bond (^b,c), Michael C. Flickinger (^b,c), Alptekin Aksan (^a); Mechanical Engineering Dept., Univ. of Minnesota, Minneapolis, USA; (^b)Biotechnology Institute, Univ. of Minnesota, St. Paul, USA; (^c)Dept. of Microbiology, Univ. of Minnesota, St. Paul, USA</td>
</tr>
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<td>08:30-08:45</td>
<td>Estimation of intracellular Effective Thermal Diffusivity in Cryopreserved Artificial Tissue #5481</td>
<td>Masanobu Ujihira, Koji Okaniwa and Kiyoshi Mabuchi; School of Allied Health Sciences &amp; Graduate School of Medical Sciences, Kitasato Univ., Sagamihara, Kanagawa, Japan</td>
</tr>
<tr>
<td>08:45-09:00</td>
<td>Measurement of Water Temperature in Micro-Region Using Near Infrared Spectroscopy #6901</td>
<td>Naoto KAKUTA (^a), Fuguo LI (^b), Hidenobu ARIMOTO (^c), and Yukio YAMADA (^b); Faculty of Engineering, Kyushu Univ., Fukuoka, Japan; (^b)Dept. Mechanical Engineering and Intelligent Systems, Univ. Electro-Communications, Chofu, Tokyo, Japan; (^c)National Institute of Advanced Industrial Science and Technology, Tsukuba, Ibaraki, Japan</td>
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<tr>
<td>09:00-09:15</td>
<td>Preliminary examination of a noninvasive technique for the measurement of thermal conductivity and thermal diffusivity of biological materials # 6517</td>
<td>Hiroshi Takamatsu(^c), Satoru Uchida(^a), Keisuke Yoshida(^a), Xing Zhang(^b), Motoo Fujii(^b); Dept. of Mechanical Engineering Science, Kyushu Univ., Fukuoka, Japan</td>
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<td>09:15-09:30</td>
<td>Influence of Solution on Time-Series Recrystallization of Ice Crystals in Tissues during Slow-Warming after Rapid-Freezing #5283</td>
<td>Hiroshi ISHIHUGO (^c), Hirokazu IMAI (^b), and Noriaki SUZUKI (^b); (^b)Graduate School of Life Science and Systems Engineering, Kyushu Institute of Technology, Fukuoka, JAPAN; (^c)Graduate School of Engineering Mechanics, Univ. of Tsukuba, Ibaraki, JAPAN</td>
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Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.3 Mechanobiological Effects of Stent Artery Interaction
Session Organizers /Chairs: Tim McGloughlin, James E. Moore
Thursday, August 3
Room G0.43

08:15-08:30 Stented Artery Biomechanics and Device Design Optimization #5108
James E. Moore Jr., Julian Bedoya, Lucas H. Timmins, Clark A. Meyer, Michael R. Moreno
Dept. of Biomedical Engineering, Texas A&M Univ., College Station, Texas, USA

08:30-08:45 Deep wall injury due to atherosclerotic plaque reconfiguration during angioplasty and in-stent restenosis #7539
Rosaire Mongrain a,b, Ramses Galaz a,b, Olivier Bertrand c; a McGill Univ., Montreal, Canada; b Montreal Heart Institute, Montreal, Canada; c Hopital Laval, Quebec, Canada

08:45-09:00 Changes in the mechanical environment of lesions due to stent-artery interaction. A computational analysis #5297
Dimitrios E. Kiousis a, Thomas C. Gasser a, Gerhard A. Holzapfel a,b; a Royal Institute of Technology (KTH), School of Engineering Sciences, Stockholm, Sweden; b Graz Univ. of Technology, Computational Biomechanics, Graz, Austria

09:00-09:15 An Investigation into the Effect of Stent Strut Thickness on Restenosis Using the Finite Element Method and Validation Using an In-Vitro Compliant Artery Model #5737
D. Toner, F. Basir, C. Lally; School of Mechanical & Manufacturing Engineering, Dublin City Univ., Glasnevin, Dublin, Ireland

09:15-09:30 Computational fluid dynamics estimates of alterations in wall shear stress influencing neointimal hyperplasia after stent implantation #6693
J.F. LaDisa a, L.E. Olson b, D.C. Warltier a, P.S. Page a; Depts. of a Pediatrics, Stanford Univ.; b Biomedical Engineering, Marquette Univ.; a Anesthesiology, Medical College of Wisconsin, Milwaukee, USA

09:30-09:45 Computational Analysis of the Performance of Drug-Eluting Stents #6797
Taewon Seo a,b, Abdul I. Barakat a; a Dept. of Mechanical and Aeronautical Engineering, Univ. of California, Davis, USA; b School of Mechanical Engineering, Andong National Univ., Andong, Korea

09:45-10:00 A sequential porohyperelastic-transport framework for simulating drug-eluting stents #6020
Peter H. Feenstra a and Charles A. Taylor b; a Mechanical Engineering, Stanford Univ., Stanford, USA; b Bioengineering and Surgery, Stanford Univ., Stanford, USA

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.9.1 Computational Bone Mechanobiology: Remodelling, Healing, Growth and Osteointegration
Session Organizers: Manuel Doblaré, Jan Herman Kuiper
Thursday, August 3
Room R1.007

08:15-08:30 Modelling geometrically accurate basic-multicellular-unit morphologies: Implications for regulation of cortical bone remodeling #5471
Grant C. Goulet a, David M. L. Cooper b, Dennis Coombe c, Ronald F. Zernicke a,d
a Schulich School of Engineering, Univ. of Calgary, Calgary, Canada
b Dept. of Orthopaedics, Univ. of British Columbia, Vancouver, Canada
c Computer Modelling Group, Ltd., Calgary, Canada; d Faculties of Kinesiology and Medicine, Univ. of Calgary, Calgary, Canada

08:30-08:45 Impact of age-dependent cortical bone rarefaction on tissue fluid pressure: Implications for mechanotransduction #5519
David M. L. Cooper a, Grant C. Goulet b, C. David L. Thomas c, John G. Clement d, Dennis Coombe e, Ronald F. Zernicke a,b,c,d,e; Dept. of Orthopaedics, Univ. of British Columbia, Vancouver, Canada; c Schulich School of Engineering, Univ. of Calgary, Calgary, Canada; d School of Dental Science, Univ. of Melbourne, Melbourne, Australia; c Computer Modeling Group, Ltd., Calgary, Canada; d Faculties of Medicine and Kinesiology, Univ. of Calgary, Calgary, Canada

08:45-09:00 Simulation of the effect of alternating resting-loading periods in bone remodeling #4953

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Thread 1: Computational Methods in Biomechanics and Mechanobiology
Thursday, August 3
Room R2.007

08:15-08:30 Real in vivo reconstruction of human coronary arteries #7676
Yiannis S. Chatzizisis¹, Panagiotis Diamantopoulos², Antonis Matakos³, George D. Giannoglou³, Cardiovascular Engineering and Atherosclerosis Laboratory, 1st Cardiology Dept., AHEPA Univ. Hospital, Medical School, Aristotle Univ. of Thessaloniki, Thessaloniki, Greece; ²Biomedical Modelling Unit, Dept. of Engineering and Design, School of Science and Technology, Univ. of Sussex, UK; ³School of Polytechnics, Aristotle Univ. of Thessaloniki, Thessaloniki, Greece

08:30-08:45 Geometric intra-subject variability of arm vessels assessed by MRA: a challenge for quantification and modeling of the vascular access for hemodialysis #6824
Luca Antiga¹, Nils Planken¹, Marina Piccinelli¹, Bogdan Ene-Iordache¹, Wouter Huberts¹, Andrea Remuzzi¹, Jan Tordoir², ¹Bioengineering Dept., Mario Negri Institute, Bergamo, Italy; ²Dept. of Surgery, Maastricht Univ. Hospital, Maastricht, The Netherlands

08:45-09:00 Implementation of non-linear, large deformation, dynamic models for traumatic events simulation on thorax and spine #7495
Carlo Frigo, Esteban E. Pavan, Matteo Achilli, Stefano Brugnetti; TBM Lab, Laboratory of Movement Biomechanics and Motor Control, Dept. of Bioengineering, Polytechnic of Milan, Milan, Italy

09:00-09:15 Development Of 3-D Finite Element Model Of Lumbosacral Vertebral Column #7701
A.B.Deoghare¹, P.M.Padole²; ¹Dept. of Mechanical Engineering, Visvesvarya National Institute of Technology, Nagpur Maharashtra, India

09:15-09:30 Analysis Of A Probabilistic Shape-Based Femur Model #6122
Todd L. Bredbenner¹, Keith A. Bartels¹, Lorena M. Havill², Daniel P. Nicoletta³; ¹Materials Engineering Dept., Southwest Research Institute, San Antonio, TX, USA; ²Medical Systems Dept., Southwest Research Institute, San Antonio, TX, USA; ³Dept. of Genetics, Southwest Foundation for Biomedical Research, San Antonio, TX, USA

09:30-09:45 Mechanical Interaction between Human Soft Tissue and Elastic Supports #5800
Gerhard Silber¹, Michael Schrodt¹, Günter Benderoth², Christophe Then³, Joern O. Balzer¹, Thomas J. Vogl¹; ¹Fachhochschule Frankfurt, Universität Main, Germany; ²Fachhochschule Frankfurt, Institut für Materialwissenschaften, Frankfurt/Main, Germany; ³Diagnostische und Interventionelle Radiologie, Klinikum der Johann Wolfgang Goethe-Universität Frankfurt, Frankfurt/Main, Germany

Plenary Lecture
10:00-10:30
G0.01
The Role of Molecular Mechanics in Intracellular Signalling: Mechanisms and Models
Thursday, Aug. 3  
11:00-12:30

1. Bone Mechanics – Joint ESB Track

1.5.2 Bone II
Chair: Peter Zioupos, Philippe Zysset
Thursday, Aug. 3
Room R0.055

11:00-11:15  Effects of structural anisotropy on the fatigue behaviour of cancellous bone# 5038
Sebastian Dendorfera, Hans Jürgen Maierb, Joachim Hammerc; aBiomechanic Research
Regensburg, Univ. of Applied Sciences Regensburg, Regensburg, Germany; bMaterials
Science Dept., Univ. of Paderborn, Paderborn, Germany

11:15-11:30  The Fracture Toughness of Cancellous Bone #6402
R.B. Cook and P. Zioupos; Dept. of Materials & Medical Sciences, Cranfield Univ.,
Shrivenham, UK

11:30-11:45  Validation of a voxel-based FE method for prediction of the uniaxial stiffness of human
trabecular bone using macroscopic mechanical tests and nanoindentation #5782
Yan Chevalier, Helga Allmer, Dieter Pahr, Mathieu Charlebois, Philippe Zysset
Institute of Lightweight Design and Structural Biomechanics, Vienna Univ. of
Technology, Vienna, Austria

11:45-12:00  The accuracy and precision of digital image correlation in quantifying local 3-D strains in
trabecular bone depend on trabecular architecture# 5487
L. Liu, E.F. Morgan; Dept. of Aerospace and Mechanical Engineering, Boston Univ.,
Boston, MA, USA

12:00-12:15  Bone tissue changes in early-stage Osteoarthritis of the human knee precede overlying
cartilage damage #4840
John P. Gleeson*, Cormac O’Connell*, Kevin U. O’Kelly*; *Trinity Centre for Bioengineering,
Dept. of Mechanical Engineering, Trinity College, Dublin 2, Ireland; *Electron Microscopy
Laboratory, Univ. College Dublin, Belfield, Dublin 4, Ireland.

12:15-12:30  Characterisation of diseased and healthy trabecular bone at many length scales #7393
R. Akhtar, S.J. Eichhorn and P.M. Mummary; School of Materials, Univ. of Manchester,
Manchester, UK

2 Musculoskeletal Mechanics-Joint ISB Track

2.5.2 Muscle Mechanics (Muscle properties – knee)
Session Organizers: Frank Baaijens, Jack Winter, Dilson Rassier
Chair: Dilson Rassier
Thursday, August 3
Room R1.049

11:00-11:15  Comparison of muscle fatigue between active and passive squat movement # 4764
Chiang Liu*, Chuan-Show Chen*, & Tzyy-Yuang Shiang*; *Dept. of Ball Sports Science,
Taipei Physical Education College, Taipei, Taiwan; †Institute of Physical Education, National
Taiwan College of Physical Education, Tai Chung, Taiwan; ‡Institute of Sports Equipment
Technology, Taipei Physical Education College, Taipei, Taiwan.

11:15-11:30  Errors in the measurement of knee joint moment during isokinetic and isometric tests
#7536
Dimitrios E Tsaopoulou*, Vasilios Baltzopoulos*, Constantinos N Maganaris*, Paula Richar‡;
*Institute for Biophysical & Clinical Research into Human Movement, Manchester
Metropolitan Univ., Alsager, U.K.; †North Staffordshire Univ. Hospital, Keele Univ., U.K.

11:30-11:45  Muscle Activation Capacity: Effects of Method, Stimuli Number and Joint Angle #6859
Bampouras T, Reeves ND, Baltzopoulos V and Maganaris CN; Institute for Biophysical &
Clinical Research into Human Movement, Manchester Metropolitan Univ., Alsager, United
Kingdom

11:45-12:00  Stretch shorten cycle enhancement decays with increased coupling time during jumping
and iso-velocity knee extensions #5937
Matthew T. G. Pain, Thomas D. O’Brien, School of Sports and Exercise Sciences,
Loughborough Univ., Loughborough, UK
2 Musculoskeletal Mechanics-Joint ISB Track

2.7.9 Musculoskeletal Modelling (Clinical Biomechanics II)

Thursday, August 3

Chair: Laurence Cheze
Room R0.002

11:00-11:15 Effect of different walking speed on plantar pressure during heel strike to mid-stance phase - 3D dynamic finite element analysis #5286
Shih-Cherng Lin a, b, Weng-Pin Chen a, Chi-Wei Yeh a, Jian-Hung Lin a, and Fuk-Tan Tang b
a Dept of Biomedical Engineering, Chung Yuan Christian Univ., Taoyuan, Taiwan, ROC
b Dept of Rehabilitation Medicine, Chang Gung Memorial Hospital, Taoyuan, Taiwan, ROC

11:15-11:30 LifeMOD modelling of a complete human body: a walk with a right knee varus and valgus movement #6886
Guillaume Agnesina, Redha Taïar; Laboratoire d'Analyse des Contraintes Mécaniques (LACM – EA 3304), UFR STAPS, Université de Reims, France

11:30-11:45 Biomechanical Evaluation of Using Iliac Bone or Rib Bone Graft in Anterior T12-L1 Interbody Fusion and Effect of Triangulation of the Anterior Fixation Screws #5270
Chih-Hsun Chien a, b, c, Weng-Pin Chen a, Tsung-Jen Huang b Chien-Yu Lin a
a Dept of Biomedical Engineering, Chung Yuan Christian Univ., Taiwan; b Dept. of Orthopaedic Surgery, Chang Gung Memorial Hospital, Taiwan; c Dept. of Orthopaedic Surgery, Ten-Chen General Hospital, Taiwan

11:45-12:00 Mandibular advancement devices design and impact on TMJ articulation: a rigid element model analysis #4591
Laurence Chèze, Univ. Lyon1, Lyon, France

12:00-12:15 Finite Element modelling of human mastication #4664
Oliver Röhrle, John Davidson, and Andrew Pullan; Bioengineering Institute, Univ. of Auckland, Auckland, New Zealand.

12:15-12:30 A biomechanical model for comparison of motor adaptation of normal subjects interacted with a shoulder-elbow rehabilitation robot #4467
Zhen-Wei Wu a, b, Ming-Shaung Ju a, c, Chou-Chin K. Lin b; a Dept. of Mechanical Engineering, National Cheng Kung Univ., Tainan, Taiwan; b Dept. of Neurology, National Cheng Kung Univ. Hospital, Tainan, Taiwan

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track

3.2.5 Falls

Session Organizer/Chair: Jaap van Dieën
Thursday, August 3
Room R1.046

11:00-11:15 Age Effects on the Interaction of the Center of Mass Motion and Lower Limb Joint Moments When Crossing Obstacles of Different Heights #4674
Ting-Ming Wang a, b, Tung-Wu Lu a, c, Hao-Ling Chen a and Wei-Chun Hsu a
a Institute of Biomedical Engineering, National Taiwan Univ., Taipei, Taiwan; b Dept. of Orthopaedic Surgery, National Taiwan Univ. Hospital, Taipei, Taiwan

11:15-11:30 Factors that Impede Forward Progression during Hemiparetic Gait: A Simulation-Based Case Study #6518
Ilse Jonkers a,b, May Liu a, Allison Arnold a, Darryl Thelen c, Frank Anderson a, Carolynn Patten a, Scott Delp b, "Depts. of Mechanical Engineering and Bioengineering, Stanford Univ., USA; aFaculty of Kinesiology and Rehabilitation Sciences, KU Leuven, Belgium; cDept. of Mechanical Engineering, Univ. of Wisconsin-Madison, USA; dRRD-center, VA-Palo Alto, USA

11:30-11:45 Set up of a clinical tool for the fall risk assessment based on a wearable device with accelerometers and rate-gyroscope s and a multi-layered perceptron #7159
Daniele Giansanti, Giovanni Maccioni, Stefano Cesinari, Velio Macellari
Dept. of Technologies and Health, National Institute of Health, Rome, Italy.

11:45-12:00 Novel: Comparing Vibratory Threshold in relation to Musculo Skeletal (Dynamic) Analysis of two types of foot. Comparative Study of Dynamic Foot Analysis and Vibratory Threshold of Foot Between Flat and Normal Foot Females #5348
S.D Nishith, P.Dhakshina Moorthy, Rahul Singh Parihar; ; Research Lab, Sardar Bhagwan Singh (P.G.), Institute Biomedical Sciences and Research, Dehradun, INDIA

12:00-12:15 Use of inclinometers for measuring postures and movements in order to predict muscle activity #5556
Ingrid Svensson a,b, Signe Jeppesen a,b, Åsa Segerström a,c, Gert-Åke Hansson a,d
a Centre of Biomechanics, Lund Univ., Lund, Sweden; bDivision of Solid Mechanics, Lund Univ., Lund, Sweden; cDept. of Physical therapy, Lund Univ., Lund, Sweden; dDept. of Occupational and Environmental Medicine, Lund Univ., Lund, Sweden

12:15-12:30 Integrated approach for active orthotic assistance of the ankle-foot complex #5563
Ivanka Veneva, Y. Toshev; Institute of Mechanics and Biomechanics, Bulgarian Academy of Sciences, Sofia, Bulgaria

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.4.4 Spine Mechanics

Session Organizers: Tom Oxland; V. J.Goel
Thursday, August 3
Room R0.006

11:00-11:15 Evaluation of the effect of lumbar posture and load magnitude on trunk muscles activities #5598
Amir H Kahlaee a, Sedighe Kahrizi a, Mohammad Parnianpour b, Mohammad Firoozabadi c
a Dep.of Physical Therapy, Tarbiat Modares Univ., Tehran, Iran; b Faculty of Mechanical Engineering, Sharif Industrial Univ., Tehran, Iran; c Dept.of Medical Physics, Tarbiat Modares Univ., Tehran, Iran

11:15-11:30 Mechanical evaluation of spinal deformation using 6-axis material testing machine #6456
Tadashi Inaba a, Iyo Nishimura a, Takaya Katoh a, Takanori Masuda a, Motoyoshi Fujiiwara a, Yuichi Kasai a, Masatake Tokuda b, cDept. of Mechanical Engineering, Mie Univ., Tsu, Japan; dMie SPTC Metals Laboratory, Kuwana, Japan; eSchool of Medicine, Mie Univ., Tsu, Japan

11:30-11:45 A detailed three-dimensional multi-body simulation of the whole lumbar spine based on two different joint configurations #5113
Alireza Abouhossein a, Bernhard Weisse a, Gabor Kovacs a, Christian Affolter a, Stephen J. Ferguson b; a Laboratory for Materials and Engineering, Swiss Federal Laboratories for Material Testing and Research (EMPA), Duebendorf, Switzerland; b MEM Research Center for Orthopaedic Surgery, Univ. of Bern, Bern, Switzerland

11:45-12:00 Force application difference between male and female physical therapists #5010
MUTA, Henrique Shimanki a, BRANDÃO, José Geraldo Trani b, aUniversidade Estadual Paulista (UNESP); bFaculdade de Engenharia de Guaratinguetá (FEG)-Guaratinguetá-SP-Brasil

12:00-12:15 3D In Vivo Spinal Motion Analysis With Fluoroscopy #5361
P.A. Thistlethwaite, S.J. Ferguson; MEM Resaerch Center, Univ. of Bern, Bern, Switzerland

12:15-12:30 Experimental methods in the examination of spine section preparations with the application of various stabilisation systems #6454
Romuald Bedzinski a, Agnieszka Szust a, Celina Pezowicz a, Barbara Pilarska b, Piotr Majcher b
a Division of Biomedical Engineering and Experimental Mechanics, Wroclaw Univ. of Technology, Wroclaw, Poland; b Medical Univ. of Lublin, Poland
3. Musculoskeletal systems and Performance-Joint ISB/ESB Track

3.5.5 Walking Dynamics

Session Organizers: Dieter Rosenbaum, Fabio Catani

Chairs: Dieter Rosenbaum

Thursday, August 3

Room R0.005

11:00-11:15 The Effect of Walking Speed on the Gait of Typically Developing Individuals #4437
Michael H. Schwartz\textsuperscript{a,b} and Joyce P. Trost\textsuperscript{a,*},\textsuperscript{a,b} Gillette Children’s Specialty Healthcare, St. Paul, Minnesota, USA; \textsuperscript{a} Univ. of Minnesota, Minneapolis, Minnesota, USA

11:15-11:30 Walking mechanics after training with an implanted functional electrical stimulation system for incomplete spinal cord injury #7691
Cleveland FES Center, Louis Stokes Cleveland VA Medical Center, Cleveland, OH, USA

11:30-11:45 Gender specific gait patterns characterized by probabilistic neural networks #4432
Vassilios G. Vardaxis\textsuperscript{a}, John Y. Goulermas\textsuperscript{b}; \textsuperscript{a}Physical Therapy Program, Des Moines Univ., Des Moines, USA; \textsuperscript{b}Dept. of Electrical Engineering and Electronics, The Univ. of Liverpool, Liverpool, UK

11:45-12:00 Changes in variability predict local stability changes in passive dynamic walkers #5479
Jimmy Li-Shin Su, Jonathan B. Dingwell; Nonlinear Biodynamics Laboratory, Univ. of Texas, Austin, TX, USA

12:00-12:15 Coordination between pelvis, thorax and leg movements in the control of total body angular momentum during walking #5074
Jaap van Dieën, Sjoerd Bruijn, Idsart Kingma, Claudine Lamoth, Onno Meijer
Institute for Fundamental and Clinical Human Movement Sciences, ‘Vrije Universiteit’, Amsterdam, The Netherlands

4. Implants for Trauma and Orthopedics-Joint ESB Track

4.8.2 Biotribology of Implants - Hip

Chair: Tom Brown

Thursday, August 3

Room E1.03

11:00-11:15 Determination of Polyethylene Wear Location and Volume in Well Functioning Acetabular Cups #6471
Robin Pourzal\textsuperscript{a}, Markus A. Wimmer\textsuperscript{b}, Alfons Fischer\textsuperscript{b}, Thorsten Schwenke\textsuperscript{b}, Robert Urban\textsuperscript{b}
\textsuperscript{a}Univ. of Duisburg-Essen, Duisburg, Germany; \textsuperscript{b}Rush Univ. Medical Center, Chicago, USA

11:15-11:30 Wear particles in failed total hip replacements made of Ti alloy# 5665
Małgorzata Figurska\textsuperscript{a}, Ingrid Milošev\textsuperscript{b,c}, Andrej Cör\textsuperscript{d}, \textsuperscript{a} Polish Academy of Science, Warsaw, Poland; \textsuperscript{b}Jožef Stefan Institute, Ljubljana, Slovenia; \textsuperscript{c}Orthopaedic Hospital Valdoltra, Ankarana, Slovenia; \textsuperscript{d}Univ. of Ljubljana, Ljubljana, Slovenia

11:30-11:45 Comparison of Wear of Ultra High Molecular Weight Polyethylene against Alumina, CoCr and Surface Engineered Coated Femoral Heads #5112
Alison L Galvin\textsuperscript{a}, Claire Brockett\textsuperscript{b}, Sophie Williams\textsuperscript{a}, Peter Hatto\textsuperscript{b}, Jonathan Thompson\textsuperscript{c}, Graham Isaac\textsuperscript{c}, Eileen Ingham\textsuperscript{c}, John Fisher\textsuperscript{c}, “Institute of Medical and Biological Engineering, Univ. of Leeds, UK; \textsuperscript{b}IonBond Ltd, Consett, UK; \textsuperscript{c}DePuy International, Leeds, UK

11:45-12:00 In vitro wear behaviour of different ceramic couplings #7730
W. Glien, Th. Oberbach, S. Begand; Mathys Orthopaedic GmbH, Moersdorf, Germany

12:00-12:15 A method for predicting the wear of the artificial joints #5696
Justin Onisoru\textsuperscript{a}, Lucian Capitanu\textsuperscript{a}, Aron Iarovic\textsuperscript{a}, Mihai Popesuc\textsuperscript{b}; \textsuperscript{a} Institute of Solid Mechanics, Bucharest, Romania; \textsuperscript{b}“Foisor” Orthopaedic Clinical Hospital, Bucharest, Romania

12:15-12:30 Effect of component size on the wear and wear debris of resurfacing hip replacements #5965
5. Occupational and Impact Injury Biomechanics

5.6.2 Abdominal Injury Biomechanics

Session Organizers /Chairs: Warren Hardy, Ali Elhagediab
Thursday, August 3
Room R0.058

11:00-11:15  Blunt hepatic trauma: Investigating the relationship between intravascular pressure and liver injury severity #6632
Jessica Sparks¹, Jason Stammen², Rodney Herriott³, Kenneth Jones⁴, John Bolte⁵

11:15-11:30  Child abdominal injuries in car restraint systems- An intra-abdominal pressure sensor for the Q-dummy family and proposed viscous injury criterion based on detailed accident analysis and their reconstructions #5133
François Alonzo, François Bermond, Philippe Beillas; INRETS - LBMC, Bron, France

11:30-11:45  Assessment of abdominal injury criteria for use with pediatric seatbelt loading #4452
Richard Kent, Steve Stacey, Jason Mattice, Matthew Kindig, Jason Forman, William Woods, Jay Evans; Univ. of Virginia, Center for Applied Biomechanics, Charlottesville, USA

11:45-12:00  Anthropometric Measures of Pediatric Seat Belt Fit #5803
Kristy B. Arbogast⁶, Shresta Mari-Gowda⁷, Eileen Houseknecht⁸, D. Andrew Mong⁹,¹⁰
¹ Center for Injury Research and Prevention, The Children’s Hospital of Philadelphia, USA
¹° Univ. of Pennsylvania School of Medicine, Philadelphia, USA

12:00-12:15  Pregnant Occupant Biomechanics in Far-Side Impacts: The Effects of Seat Friction and Console Height #5330
Stefan Duma, David Moorcroft, Greg Duma, Joel Stitzel; Virginia Tech – Wake Forest, Center for Injury Biomechanics, Blacksburg, Virginia, USA

12:15-12:30  The MAMA-2B: An Improved Pregnant Crash Test Dummy #7270
Jonathan D. Rupp¹, Kathleen D. Klinich², Nathaniel H. Madura³, Carl S. Miller⁴, Mark D. Pearlman⁵, and Lawrence W. Schneider⁶,⁷; ¹Univ. of Michigan Transportation Research Institute (UMTRI), ²Univ. of Michigan Dept. of Biomedical Engineering, ³Univ. of Health Systems, Ann Arbor, MI, USA

6. Sport Biomechanics-Joint ISB Track

6.4.3.1 Skiing

Session Organizers /Chairs: Erich Müller, Veit Senner
Thursday, August 3
Room D2.12

11:00-11:15  Freestyle aerial skiing motion analysis and simulation #7811
Anton Lüthi, Gernot Böttinger, Thiemo Theile, Hansueli Rhynner, Walter Ammann
WSL Swiss Federal Institute for Snow and Avalanche Research SLF, Davos, Switzerland

11:15-11:30  From Red Cells to Skiing: A Realistic Model for Lift Mechanics of Downhill Skiing and Snowboarding #4293
Qianhong Wu¹, Yiannis Andreopoulos² and Sheldon Weinbaum³; ¹Dept. of Mechanical Engineering, Villanova Univ., USA; ²Depts. of Biomedical and Mechanical Engineering & New York Center for Biomedical Engineering, The City College of New York, USA.

11:30-11:45  Joint loading on the lower extremities in skiing and snowboarding: methodological procedure #7864
Klaus Miriam, Schwameder Hermann, Müller Erich; Dept. of Sport Science and Kinesiology, Univ. of Salzburg, Austria; Christian Doppler Laboratory ‘Biomechanics in Skiing’, Univ. of Salzburg, Austria

11:45-12:00  Reliability of EMG median power frequency analysis in recreational alpine skiing #7871
Josef Kröll⁴, John Seifert⁵, Erich Müller⁶,⁷; ⁴Dept. of Sport Science and Kinesiology Univ. of Salzburg, Salzburg, Austria; ⁵CD-Laboratory “Biomechanics in Skiing” Salzburg, Austria; ⁶ St. Cloud State Univ., St. Cloud, United States

12:00-12:15  Safety in Skiing #7911
Veit Senner

12:15-12:30 Biomechanical characteristics of further developed classical and skating techniques in cross-country skiing sprint competitions #7870
Stefan Lindinger¹, Thomas Stoeggla², Erich Muellera², b; ¹Dept. of Sport Science and Kinesiology, Univ. of Salzburg, Austria; ²Christian Doppler-Lab “Biomechanic in Skiing”, Salzburg, Austria

7. Dental Biomechanics
7.2 Periodontal Ligament Mechanics - Mechanics in Orthodontics
Session Organizers: Christoph Bourauel, Christopher Provatidis
Thursday, August 3
Room R1.006
11:00-11:15 Material parameters of the periodontal ligament – Combined experimental and numerical studies on human, pig and rat specimens #5812
Christoph Bourauel, Susanne Reimann, Ludger Keilig, Alireza Rahimi, Afshar Kawarizadeh, Andreas Jäger; Dept. of Orthodontics, Univ. of Bonn, Germany

11:15-11:30 Orthodontic movement of single-rooted teeth in torsion #7469
Christopher G. Provatidis; National Technical Univ. of Athens, Mechanical Design and Control Systems Section, Biomechanics Unit, Athens, Greece

11:30-11:45 Alveolar bone structure and remodeling patterns: how stable are our teeth? #5881
Michel Dalstra³, Mauricio T. Sakima³, Paolo M. Cattaneo³, Birte Melsen³; ³Dept. of Orthodontics, Univ. of Aarhus, Aarhus, Denmark; ⁴Dept. Clinica Infantil, Univ. of São Paulo State, Araraquara, Brazil

11:45-12:00 Development of novel techniques in vivo measurement of mechanical properties of periodontal ligament #5974
H. Liu⁵, S. L. Evans⁶, C. Holt⁷, A. Zhurov⁸, J. Middleton⁹; ⁵School of Engineering, Cardiff Univ., UK; ⁶School of Dentistry, Cardiff Univ., UK, Queen’s Buildings, The Parade, Cardiff, UK

12:00-12:15 A non-linear anisotropic constitutive model for the periodontal ligament #6130
Alexei I. Zhurov⁴, Georges Limbert⁴, Cathy Holt⁵, Helen Liu⁶, John Middleton⁶; ⁴Cardiff Univ., Wales College of Medicine, School of Dentistry, Cardiff, Wales, UK; ⁵Cardiff Univ., School of Engineering, Cardiff, Wales, UK

12:15-12:30 An anisotropic and visco-elastic constitutive model including damage phenomena and its application to the mechanical response of the periodontal ligament #5153
A.N. Natali, E.L. Carmiel, P.G. Pavan; Centre of Mechanics of Biological Materials, Univ. of Padova, Padova, Italy

8. Computer-Assisted Surgery
8.2 Smart Surgical Devices
Session Organizer /Chairs: Lutz Nolte, Tim Lüth
Thursday, August 3
Room R1.003
11:00-11:15 Smart surgical instrument for spinal interventions #6704
J. Burger, W. Piotrowski, S. Ambrosetti, M. Krenn, A. Pfenniger, A. Stahel, S. Olsen, S. Ferguson, M. Loefel, L. Nolte, Univ. of Applied Sciences Bern, HTI, Biel, Switzerland; MEM Research Center, Univ. of Berne, Berne, Switzerland; Christian-Doppler-Clinic, Salzburg, Austria

11:15-11:30 Feasibility Study of a Wireless Instrumented Device to Measure Differential Ligament Stress in Total Knee Arthroplasty #7390
Danilo DeLorenzo, Oscar Effetti, Elena De Momi, Pietro Cerveri, Giancarlo Ferrigno TBM Lab, Bioengineering Dept., Politecnico di Milano, Milan, Italy

11:30-11:45 Computer-assisted delivery of injectable bone substitutes and biomaterials #7831
M. Loefel², P. F. Hein³, N. Bouduban³, J. Burger³, J. Kowal³, MEM Research Center ISTB, Univ. of Bern, Switzerland; ³Dept. of Orthopaedic Surgery, Inselspital, Univ. of Bern, Switzerland; School of Engineering and Information Technology, HTI Biel, Switzerland

11:45-12:00 An artificial worm for minimally invasive surgery #7398
9. Tissue Engineering

9.3 Ligament and Tendon Tissue Engineering

Session Organizer /Chair: James Goh

Thursday, August 3

Room R1.004

11:00-11:15 Mechanical characterisation of rabbit Achilles tendon for functional tissue engineering #5794
C Kahn, C Vaquette, S Slimani, R Rahouadj, X Wang; LEMTA UMR 7563 CNRS, Vandoeuvre-les-Nancy, France

11:15-11:30 Effect of mechanical strain on human tenocytes seeded on a novel polylactide scaffold for tissue engineering of ligaments #4851
H-J Schlenker, L Kreja, M Dauner, G Bergenthal, L Claes, A Ignatius; Univ. of Ulm, Ulm, Germany

11:30-11:45 A knitted scaffold for ligament tissue engineering #5750
C Vaquette, R Rahouadj, Xiong Wang; LEMTA UMR 7563 CNRS, Vandoeuvre-les-Nancy, France

11:45-12:00 Mechanical loading of mesenchymal progenitor cells in a collagen I scaffold for ligament tissue engineering #4852
H-J Schlenker, A Thiel, L Kreja, G Bergenthal, L Claes, A Ignatius; Univ. of Ulm, Ulm, Germany

12:00-12:15 The Potential Use of Enamel Matrix Derivative (EMD) for In Situ Anterior Cruciate Ligament (ACL) Tissue Engineering. An In Vitro Investigation #4602
MP Messenger, SJ Brookes, EM Raif, BB Seedhom; The Univ. of Leeds, UK

10. Cellular and Molecular Mechanics

10.5.2 Mechanotransduction

Session Organizers: Mohammad Kaazempur-Mofrad, Brian Helmke

Thursday, August 3

Room R0.56

11:00-11:15 The glycocalyx as a mechanosensor for fluid shear stress #4349
Yu Yao, Aleksand Rabodzey, C. Forbes Dewey, Jr.; Hatsopoulos Microfluids Lab, Massachusetts Institute of Technology, Cambridge, USA

11:15-11:30 The dynamics of extracellular mechanotransduction in bronchial epithelium #6948
Nikola Kojic, Peter So, Daniel J. Tschumperlin; a Harvard-MIT Division of Health Sciences and Technology, Cambridge, USA; b Physiology Program, Harvard School of Public Health, Boston, USA

11:30-11:45 Effects of hydrostatic pressure on ERK signalling of chondrocytes cultured in agarose gel #5380
Kensuke Mio, Jennifer Kirkham, William A. Bonass; a Academic Unit of Musculo-Skeletal and Rehabilitation Medicine, Bioengineering Division, Univ. of Leeds, Leeds, UK; b Dept. of Oral Biology, Leeds Dental Institute, Univ. of Leeds, Leeds, UK

11:45-12:00 Mechanically loaded photopolymerized hydrogels as 3D models to probe mechanotransduction pathways in chondrocytes #7474
Stephanie Bryant, Idalis Villanueva; Dept. of Chemical and Biological Engineering, Univ. of Colorado, Boulder, CO, USA

12:00-12:15 Evaluation of local strain magnitude at initiation point of calcium signaling response to mechanical stimuli in osteoblastic cells #5485
11. Artificial Organs

11.3.1 Artificial Liver

Session Organizers /Chairs: Cecile Legallais, Igor Sauer

Thursday, August 3
Room R1.002

11:00-11:30 Artificial organs using miniature swine #4920
Naruse K, Makuuchi M.; Division of Artificial Organs and Transplantation, Dept. of Surgery, Univ. of Tokyo, Japan

11:30-11:45 Artificial liver support: New challenges for the application of extracorporeal blood circuits #7206
Joerg Vienken; Fresenius Medical Care, BioSciences Dept., Bad Homburg, Germany

11:45-12:00 In vitro optimization of alginate bead production for hepatocytes encapsulation in the fluidized bed bioartificial liver #6941
A. Gautier	extsuperscript{a}, A. Kinasiewicz	extsuperscript{b}, B. Carpenter	extsuperscript{a}, D. Lewinska	extsuperscript{b}, P. Paullier	extsuperscript{a}, J. Bukowski	extsuperscript{b}, A. Werynsky	extsuperscript{b}, C. Legallais	extsuperscript{a};	extsuperscript{a}Université de Technologie de Compiègne, CNRS UMR 6600, Biomécanique et Génie Biomédical, Compiègne, France; 	extsuperscript{b}Institute of Biocybernetics and Biomedical Engineering, Polish Academy of Sciences, Warsaw, Poland

12:00-12:15 Numerical modeling of oxygen availability in the AMC bioartificial liver #6608
Guy Mareels	extsuperscript{a}, Paul P.C. Poyck	extsuperscript{b}, Sunny Elloot	extsuperscript{a}, Robert A.F.M. Chamuleau	extsuperscript{b}, Pascal R. Verdonck	extsuperscript{b}; 	extsuperscript{a}Cardiovascular Mechanics and Biofluid Dynamics research unit, Institute of Biomedical Technology, Ghent Univ., Belgium; 	extsuperscript{b}Depts. of Experimental Surgery and Hepatology, Amsterdam Medical Center, Univ. of Amsterdam, The Netherlands

12:15-12:30 Development of a Standardised Bioreactor with 3D Capillary Membrane Structure #7218
U. Kertzschera, L. Goubergritsa, K. Afffelda, I. Guidoa, P. Scharfschwerta, J. Hengstlerb; 	extsuperscript{a}Biofluidmechanics Laboratory, Charité, Berlin, Germany; 	extsuperscript{b}Universität Leipzig, Zentrum für Toxikologie, Leipzig, Germany

12. Biomaterials

12.3.1 Biomaterial in Biomechanical Applications-Joint ESB Session

Session Organizers /Chairs: Elizabeth Tanner, Damien Lacroix

Thursday, August 3
Room R1.001

11:00-11:15 A simple and applicable electrospinning process to fabricate highly oriented PCL scaffold #7806
GeunHyung Kim, Tae Jin Min, Su A Park, Jong Ha Park, Wan-Doo Kim
Bio-Mechatronics Lab, Dept. of Future Technology, Korea Institute of Machinery and Materials (KIMM), Daejeon, Korea

11:15-11:30 Micromechanics of Electrospun Poly Ester Urea Scaffolds for Soft Tissue Engineering #7515
Todd Courtney, Jun Liao, John Stankus, Jianjun Guan, William Wagner, and Michael Sacks
Univ. of Pittsburgh, Dept. of Bioengineering, Pittsburgh, PA, USA

11:30-11:45 Mechanical characterisation of bio-compatible, electro-spun non-wovens #5759
C.R. Jaeger, C. Sauerbier; Fraunhofer-Institut für Werkstoffmechanik, Freiburg, Germany

11:45-12:00 Discrimination of PMMA fatigue crack surface #6274
Paolo Erani	extsuperscript{a}, Marco Cotifava	extsuperscript{b}, Luca Cristofolini	extsuperscript{a,b}, Maria Chiara Bignozzi	extsuperscript{b}, Massimiliano Baleani	extsuperscript{a}; 	extsuperscript{a}Medical Technology Lab, Rizzoli Orthopaedic Institutes, Bologna, Italy; 	extsuperscript{b}Engineering Faculty, Univ. of Bologna, Italy

12:00-12:15 The influence of cement viscosity during initial pressurisation and cup insertion on its penetration depth in an acetabular model #6905
Saba Abdulghani, Gunnar Flivik, Jian-Sheng Wang and Ian McCarthy
Dept. of Orthopaedics, Lund Univ. Hospital, Lund, Sweden
12:15-12:30  Flexural properties of acrylic bone cements #5309
I. Knets, V.Krilova, R.Cimdins, L.Berzina, V.Vitins; Institute of Biomaterials and Biomechanics of the Riga Technical Univ., Riga, Latvia

13. Respiratory Mechanics
13.6.2. Transport in the Upper Airways
Session Organizers /Chairs: Dennis Doorly, Tilman Keck
Thursday, August 3
Room R2.088

11:00-11:30  Keynote: Upper airway function: objective measures and computer simulation #4351
Tilman Keck, Ajnacska Rozsasi; Dept. of Otorhinolaryngology, Univ. of Ulm, Ulm, Germany

11:30-11:45  Numerical and experimental study on nasal airflow #6394
Bruno Louis², Céline Croc², Jean-François Papon²ab, Jean-Robert Blondeau², Georges Cailléb², André Coste²ab, Gabriela Sbirlea-Apiou², Daniel Isaby², Redouane Fodila²
²Fonctions Cellulaires et Moléculaires de l'Appareil Respiratoire et des Vaisseaux INSERM U651, Créteil, France; abServices de Radiologie, d’ORL et de Chirurgie Cervico-Faciale, CHIC et Hôpital Henri Mondor (AP-HP), Créteil, France; Centre de Recherche Claude Delorme, Air Liquide, Jouy-en-Josas, France

11:45-12:00  An experimental investigation on airflow in human airway #4942
Seung-Kyu Chu², Sung Kyun Kim³, Dept. of ORL-HNS, Samsung Medical Center, School of Medicine, Sungkyunkwan Univ., South Korea;³ Dept. Mechanical Engineering, Konkuk Univ., South Korea

12:00-12:15  Characterisation of nasal geometry and flow #6735
Alberto Gambaruto, Denis Doorly; Dept. Aeronautics, Imperial College, London, UK

12:15-12:30  Airflow in the human nasal cavity #7567
Donal J. Taylor²ab, Denis J. Doorly³, Robert C. Schroter³
²Depts. of Aeronautics and Bioengineering², Imperial College London, London, UK

14. Cardiovascular Mechanics
14.2.2 Cardiac Mechanics and Biology
Session Organizers /Chairs: Motoaki Sugawara, Justin Davies
Thursday, August 3
Room G1.27

11:00-11:15  Myocardial Material Parameter Estimation: The Influences of Constitutive Relation and Experimental Protocol #4021
H Schmid², MP Nash³, W Lin³, R Kirt³, P O’Calaghan³, IJ LeGrice², AA Young², PJ Hunter³
²Univ. of Auckland, Auckland, New Zealand;³AgResearch, Hamilton, New Zealand

11:15-11:30  Vortex Hemodynamics
David Auerbach, Department of Physiology, Medical University Graz, Harrachgasse, 17/V, 8010 Graz, Austria

11:30-11:45  On the Dynamics of the Human Heart Myocardium # 5545
Anna Grosberg, Mory Gharib; California Institute of Technology, Bioengineering Option, Pasadena, USA

11:45-11:00  Myocardial Topology – An Algorithm for Building Statistically Realistic Myocardial Sheets #4229
H. Schmid², M.P. Nash³, M. McCormick³, C. Walker³, G.B. Sands³, I.J. LeGrice², P.J. Hunter³
²Bioengineering Institute, Univ. of Auckland, New Zealand;³Dept. of Engineering Science, Univ. of Auckland, New Zealand

11:00-11:15  Study Of Arrhthymia Using Computational Model Of Ventricular Myocyte # 6491
R.Malathi and M.Ramasubba Reddy; Dept. of Applied Mechanics, Indian Institute of Technology, Madras, India

11:15-11:30  Cellular Mechanisms of Cardiac Action Potential Conduction Slowing by Myocardial Strain #6333
Robert W. Mills³, Sanjiv M. Narayan³, Andrew D. McCulloch⁴;³ Dept. of Bioengineering, Univ. of California San Diego, USA;⁴ Dept. of Medicine, Univ. of California San Diego
14. Cardiovascular Mechanics
14.8 Flow Measurement and Imaging-In Vivo and In Vitro with Applications
14.8.1 MRI
Session Organizer: Peter Boesiger
Chair: Dieter Liepsch
Thursday, August 3
Room G2.36
11:00-11:15  A Mathematical Tool for Quantitative Evaluation of Medical Flow Imaging Algorithms #5705
A. Pashaee and N. Fatouraee; Biological Fluid Mechanics Laboratory, Biomedical Engineering Faculty, Amirkabir Univ. of Technology, Tehran, Iran

11:15-11:30  Effects of calf compression on the deformation of deep and superficial veins in the lower limb #4818
a Steven P. Downie, a Xiao Yun Xu, a Nigel Wood, b David N. Firmin, c Simon Thom, d John N. H. Wolfe; a Dept. of Chemical Engineering, b NHLI, CMR Unit, Royal Brompton and Harefield NHS Trust, c NHLI, International Centre for Circulatory health & d Vascular Surgery, St Mary’s Hospital, Imperial College London, UK

11:30-11:45  Characterization of tissue components for atherosclerotic plaques using ex vivo hrMR and synchrotron tomography #4629
Martin Auer a, Fabian Schmid b, Rudolf Stollberger c, Peter Regitnig d, Ralf H. Menk e, Luigi Rigon f, Gerhard A. Holzapfel a, b, Graz Univ. of Technology, Computational Biomechanics, Graz, Austria; b Austrian Academy of Sciences, Institute of Biophysics and X-ray Structure Research c/o Synchrotron Trieste, Basovizza (TS), Italy; c Medical Univ. Graz, Dept. of Radiology, Graz, Austria; a Medical Univ. Graz, Institute of Pathology, Graz, Austria; a, b Synchrotron Trieste, S.c.p.A, Basovizza (TS), Italy; d ICTP (International Center for Theoretical Physics), Trieste, Italy; e Royal Institute of Technology, School of Engineering Sciences, Stockholm, Sweden

11:45-12:00  Differences in velocity profiles between young and elderly healthy volunteers affect wall shear stress assessment with the paraboloid method in the internal carotid artery; a study with velocity encoded MRI #5533
Friekke M.A. Boxa, Rob J. van der Geestb, Matthias J.P. van Oschb, Jeroen van der Grondb, Anton J.M. de Craenb, Gerard J. Blauwc, Mark A. van Buchemb, Johan H.C. Reiberb, a Division of Image Processing, Univ. Medical Center, Leiden, Netherlands; b Dept. of Radiology, Univ. Medical Center, Leiden, Netherlands; c Dept. of Gerontology & Geriatrics, Univ. Medical Center, Leiden, Netherlands

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14. Cardiovascular Mechanics
14.12.1 Tissue Adaptation and Remodelling
Session Organizers /Chairs: Kozaburo Hayashi, Alexander Rachev
Thursday, August 3
Thursday, August 3
Room G0.01
11:00-11:30  Keynote: Theoretical framework for vascular growth and remodeling #4290
J.D Humphrey; Dept. of Biomedical Engineering, Texas A&M Univ., College Station, TX - USA

11:30-11:45  On a theory of growth and residual stress in soft tissue #6736
A. Guillou a, R.W. Ogden b, a Dipartimento di Matematica, Politecnico di Torino, Italy; b Dept. of Mathematics, Univ. of Glasgow, UK
11:45-12:00  Stress-modulated remodeling of a non-homogeneous body #4983
D. Ambrosi, A. Guillou; Dipartimento di Matematica, Politecnico di Torino, Torino, Italy
E.S. Di Martino, Institute for Complex Engineered Systems, Cardiovascular Biomechanics Lab, Carnegie Mellon Univ., Pittsburgh, PA, USA

12:00-12:15  Dynamics of arterial remodeling in response to hypertension using a structural-based model #6894
A. Tsamis and N. Stergiopulos; Laboratory of Hemodynamics and Cardiovascular Technology, EPFL, Lausanne, Switzerland

12:15-12:30  Computational simulation of growth and remodeling #4491
Grieta Himpel, Ellen Kuhl, Andreas Menzel, Paul Steinmann
Applied Mechanics, Univ. of Kaiserslautern, Kaiserslautern, Germany

19. Biotransport
19.7 Multiscale Imaging and Visualization in Biotransport
Session Organizer /Chair: Oana Craciunescu
Thursday, August 3
Room R0.003

11:00-11:15  Optimal hyperthermia (HT) treatment of advanced extremity sarcomas using combined Dynamic-Enhanced Magnetic Resonance Imaging (DE-MRI) and Magnetic Resonance Thermal Imaging (MRTI) #4447
O.I. Craciunescu a, J.R. MacFall b, T.E. Raidy a, Z. Vujaskovic a, E.L. Jones a, N.A. Larrier a, O.A. Arabe a, S.D. V. Liotcheva a, T.Z. Wong a, T.V. Samulski a, M.W. Dewhirst a,
 a Dept. of Radiation Oncology; b Radiology, Univ. Medical Center, Durham, NC, USA

11:15-11:30  Efficacy and biodistribution of gold nanoparticles #6481
Rachana Visaria a, Robert Griffin a, Susanta Hui a, Brent Williams a, Emad Ebbini a, Giulio Pacotti b, Chang Song a, John Bischof a;
 a Univ. of Minnesota, Minneapolis, MN, USA; b CytImmune Sciences, Inc., Rockville, MD, USA

11:30-11:45  Monitoring Tumour Dynamics in Xenografts via Thermography #4578
C Song, V Appleyard, K Murray, T.G. Frank, A Cuschieri, and A Thompson
Dept. of Surgery & Molecular Oncology, Univ. of Dundee, Scotland

11:45-12:00  An experimental study of the flow temperature and velocity field in a heated stenosis #5596
Ch. G. Stamatopoulos, D. S. Mathioulakis; Fluids Section, School of Mechanical Engineering, National Technical Univ. of Athens, Greece

12:00-12:15  Heating, Movement and Visualization Challenges in the Use of Iron Oxide Nanoparticles For Biomedical Applications #6940
Venkat Kalambur, John Bischof; Dept. of Mechanical Engineering, Univ. of Minnesota, Minneapolis, MN, USA

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.4 Computational Modeling and Mechanobiology of Vascular Anastomosis
Session Organizers /Chairs: Gabriele Dubini, Joaquim Peiro
Thursday, August 3
Room G0.43

11:00-11:15  Transmural stress during bypass surgery: a patient-specific computational analysis #4884
Fernando Cacho a,b, Manuel Doblaré b, Gerhard A. Holzapfel a,c; a Graz Univ. of Technology, Computational Biomechanics, Graz, Austria; b Univ. of Zaragoza, Group of Structural Mechanics and Materials Modeling (GEMM), Aragon Institute of Engineering Research (I3A), Zaragoza, Spain; c Royal Institute of Technology, School of Engineering Sciences, Stockholm, Sweden

11:15-11:30  That the End-to-End Anastomosis is Superior to the End-to-Side Anastomosis for Peripheral Bypass Surgery: Observations from Computational Studies #6261
O’Brien, T.P a, Walsh, M.T. a, Grace, P. a, Devereux, P.D. a, O’Callaghan, S.M. a, Burke, P. b,
 a McGloughlin, T.M. b, c Centre for Applied Biomechanical Engineering Research and Materials and Surface Science Institute, Univ. of Limerick, Limerick, Ireland; b Dept. of Vascular Surgery, Mid-Western Regional Hospital Limerick, Ireland.
11:30-11:45  Non-Newtonian effects of pulsatile blood flow in non-planar distal end-to-side anastomosis #5963
Wen Wang & Qian Wang; Medical Engineering Division, Dept. of Engineering, Queen Mary, Univ. of London, London, UK

11:45-12:00  Flow instability in a failed brachio-cephalic graft for hemodialysis: a computational study #6831
Luca Antiga, Nils Planken, Bogdan Ene-Iordache, Marina Piccinelli, Jan Tordoir, Andrea Remuzzi; a Bioengineering Dept., Mario Negri Institute, Bergamo, Italy; b Dept. of Surgery, Maastricht Univ. Hospital, The Netherlands

12:00-12:15  Mathematical Modeling Of Blood Flow in an Arterial Bypass Anastomosis #6228
Gaurav Varshney and V.K. Katiyar; Dept. of Mathematics, Indian Institute of Technology Roorkee, Roorkee, India

12:15-12:30  Simulation of Macromolecules Transport within the Arterial Wall and Links to Atherogenesis #6784
Afsaneh Mojra, and Nasser Fatourae; Biomedical Engineering Faculty, Amirkabir Univ. of Technology (Tehran Polytechnic), Tehran, Iran

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.9.2 Computational Bone Mechanobiology: Remodelling, Healing, Growth and Osteointegration

Session Organizers: Manuel Doblaré, Jan Herman Kuiper
Thursday, August 3
Room R1.007

11:00-11:15  A mathematical model approach of bone regeneration using scaffolds #4587
J. A. Sanz, J. M Garcia-Aznar, M. Doblaré; Aragon Institute of Engineering Research (I3A), Univ. of Zaragoza, Zaragoza, Spain

11:15-11:30  Numerical simulation of bone ingrowth after total knee arthroplasty #5927
Lucian G. Gruionu, Paul L. Rinderu; Univ. of Craiova, Romania

11:30-11:45  Press-fit and the Alloclassic stem: FE predictions vs. clinical evidence #6733
MJ Schmitz, R Howald, M Froehlich, E Siggelkow, D Hertig and SE Clift; a Dept. of Mechanical Engineering, Univ. of Bath, UK, b Zimmer GmbH, Winterthur, Switzerland

11:45-12:00  A Mechanobiological Model of Periprosthetic Tissue Healing #5323
Pascal Swider, Dominique Ambard, Joan E. Bechtold; a Biomechanics Laboratory EA 3697, Toulouse, France; b Midwest Orthopaedic Research Foundation, Minneapolis, MN, USA; c Univ. Hospital of Aarhus, Aarhus, Denmark

12:00-12:15  Simulations predicting bone remodelling and interfacial tissue formation in uncemented hip replacements #5749
Paul T. Scannell, Patrick J. Prendergast; Trinity Centre for Bioengineering, School of Engineering, Trinity College Dublin, Ireland

Thread 4: Imaging
T4.5 Cardiac Elastography
These presentations are in conjunction with Track 14 Cardiovascular Mechanics

Session Organizer /Chair: Krzysztof Kaluzynski
Thursday, August 3
Room R1.008

11:00-11:30  Keynote: Cardiac deformation imaging with ultrasound: technical aspects #6395
Jan D'hooge, Cardiac Imaging Research, Catholic Univ. of Leuven, Belgium

11:30-11:45  Cardiac deformation imaging with ultrasound: potential clinical applications #6858
M. Kowalski, E. Kowalik, P. Hoffman; Institute of Cardiology, Warsaw, Poland

11:45-12:00  2D displacement estimation in ultrasonic elastography with angular insonification #7425
B. Lesniak, W. Khaled, H. Ermerl, S. Cygan, K. Kaluzynski; a Institute of Precision and Biomedical Engineering, Warsaw Univ. of Technology, Warsaw, Poland; b Institute of High Frequency Engineering, Ruhr-Univ., Bochum, Germany

12:00-12:15  Ultrasound elastography in consideration of finite deformations #5738
Stefan Reichling, Walaa Khaled, Otto Timme Bruhns, Helmut Ermerl; a Institute of Mechanics, Ruhr-Univ. Bochum, Bochum, Germany

b Institute of High Frequency Engineering, Ruhr-Univ. Bochum, Germany
Application of acoustoelasticity to biological tissues: a novel non-invasive technique for tissue property evaluation #4533
Hirohito Kobayashi, Ray Vanderby; Dept. of Orthopedics and Rehabilitation, Univ. of Wisconsin-Madison, Wisconsin, USA

Thursday, Aug. 3
14:00-15:30
1. Bone Mechanics – Joint ESB Track
1.5 Bone Tissue III
Session Organizer: Peter Augat, Ivars Knets
Thursday, Aug. 3
Room R0.055
14:00-14:15 Speckle interferometry: a novel method to map three-dimensional surface deformations of small bone samples #4084
Ron Shahrain, Paul Zaslanskyben, Meir Barakb, Asher A Friesemc, John D.Curreyd and Steve Weinerf; a Koret School of Veterinary Medicine, The Hebrew Univ. of Jerusalem, Israel; b Dept. of Structural Biology, Weizmann Institute of Science, Israel; c Dept. of Physics of Complex Systems, Weizmann Institute of Science, Israel; d Dept. of Biology, Univ. of York, UK
14:15-14:30 Beam theory strongly underestimates bone tissue properties in a murine model of bone genetics #5907
G. Harry van Lenthe, Romain Voide, Ralph Müller; Institute for Biomedical Engineering, Univ. and ETH Zürich, Switzerland
14:30-14:45 A numerical investigation of the overall cortical bone anisotropy: contributions of material symmetry and micro-architecture #4760
Quentin Grimala, Kay Raum, Vincent Liabeuf, Pascal Laugier; a Laboratoire d'imagerie paramétrique, Université Pierre et Marie Curie-Paris6; CNRS UMR 7623; Paris, France
14:45-15:00 Determination of transverse isotropic stiffness coefficients from high resolution angular acoustic impedance measurements #5857
Lakshmanan Sannachi, Andreas Bodi and Kay Raum; Q-BAM Group, Dept. of Orthopedics, Martin Luther Univ. of Halle-Wittenberg, Germany
15:00-15:15 Apparent Young's modulus of human radius using inverse finite element method #5201
M.R.Bosisioa, M.Talmantb, W.Skallia, P.Laugierb and D.Mittona
a Laboratoire de Biomécanique ENSAM-CNRS Paris, France ; b Laboratoire d’Imagerie Paramétrique ParisVI-CNRS, Paris, France.
15:15-15:30 Variability of the mechanical properties of bone #4344
John Currey; Dept Biology, Univ. of York, York, UK

2 Musculoskeletal Mechanics-Joint ISB Track
2.5.3 Muscle Mechanics (Cellular and Molecular muscle mechanics)
Session Organizers /Chairs: Frank Baaijens, Jack Winter, Dilson Rassier
Thursday, August 3
Room R1.049
14:00-14:15 Skeletal muscle stretch and cross-bridge dynamics # 5939
Dilson E. Rassier; McGill Univ., Montreal, PQ, Canada
14:15-14:30 Passive force enhancement or not? #4259
W. Herzog; Faculties of Kinesiology, Engineering and Medicine, Univ. of Calgary, Calgary, Canada
14:30-15:00 Temperature-jump-induced (endothermic) muscle force generation is sensitive to filament sliding, demonstrating the Fenn effect # 4789
K. W. Ranatunga, M. E. Coupland and G. J. Pinniger
Dept. of Physiology, School of Medical Sciences, Univ. of Bristol, Bristol, UK
15:00-15:30 Origin of complex force kinetics in striated muscles: cross-bridge kinetics or sarcomere dynamics? #4796
Robert Stehle, Ivo A. Telley, Jachen Denoth, and Gabriele Pfitzer
2.7.10 Musculoskeletal Modelling meets Muscle Physiology (Invited speakers)

Session Organizers: Ton van den Bogert, Maarten Bobbert

Thursday, August 3
Room R0.002

14:00-14:15 Simulation models of human vertical jumping: case settled? #6482
Maarten F. Bobbert, Institute for Fundamental and Clinical Human Movement Sciences, Amsterdam, The Netherlands

14:15-14:30 Modeling Vertical Jumping in Bonobo (Pan paniscus) #6217
Melanie N. Scholz; Institute for Fundamental and Clinical Human Movement Sciences (IFKB), Amsterdam, The Netherlands

14:30-14:45 An experimental approach for obtaining joint torque strength parameters for use in a whole body simulation model #6111
Maurice R. Yeadon and Mark A. King; School of Sport and Exercise Sciences, Loughborough Univ., UK

14:45-15:00 Modelling of Muscle Moment-Angle Relations Using a Mechanistic Approach #6887
Constantinos N. Maganaris, Institute for Biophysical & Clinical Research into Human Movement, Manchester Metropolitan Univ. Cheshire, Stoke-on-Trent, UK

15:00-15:15 Specific tension of intact and skinned muscle fibres #6141
Richard T. Jaspers a, Hans Degens b, Peter A. Huijing a and Willem J. van der Laarse a
a Instituut voor Fundamentele and Klinische Bewegingswetenschappen, Vrije Universiteit Amsterdam, b Dept. of Physiology, Vrije Universiteit Medical Center, Amsterdam, The Netherlands, a Institute for Biophysical and Clinical Research into Human Movement, Manchester Metropolitan Univ., Cheshire, UK

15:15-15:30 All you need is work: Muscle function predicted from fiber kinematics #6318
Antonie J. van den Bogert a, Constantinos N. Maganaris b, Maarten F. Bobbert c
a Cleveland Clinic Foundation, Cleveland, USA; b Manchester Metropolitan Univ., Manchester, United Kingdom; c Vrije Universiteit Amsterdam, The Netherlands

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track

3.2.6 Falls

Session Organizer/Chair: Jaap van Dieën

Thursday, August 3
Room R1.046

14:00-14:15 Initial Effects of the Ankle Dorsiflexion Mobilization with Movement on Ankle Range of Motion and Limb Coordination in Young Healthy Subjects #5271
Chich-Haung Yang a, c, Lan-Yuen Guo a, c, Henry Tsao b, Ching-Yi Wang a, c, Chung-Chao Liang a, c
a Dept. of Physical Therapy, Tzu-Chi College of Technology, Hua-Lien, Taiwan; c Human Neuroscience Unit, Division of Physiotherapy, The Univ. of Queensland, Queensland, Australia; a, c Dept. of Physical Medicine and Rehabilitation, Tzu-Chi General Hospital, Hua-Lien, Taiwan

14:15-14:30 Interjoint coordination of the leading swing limb when crossing obstacles of different heights #4171
Hsiao-Ching Yen a, b, Tung-Wu Lu a, Hao-Ling Chen a; a Institute of Biomedical Engineering, National Taiwan Univ., Taipei, Taiwan; b Dept. of Physical Medicine and Rehabilitation, National Taiwan Univ. Hospital, Taipei, Taiwan

14:30-14:45 Withdrawn

14:45-15:00 Does limb dominance affect response to lateral support surface perturbations? #7573
Jos Vanrenterghem, Adrian Lees, Gabor Barton, Mark Lake; Liverpool John Moores Univ., Liverpool, UK

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track

3.4.5 Spine Mechanics

Session Organizers: Tom Oxland, V. J.Goel

Thursday, August 3
Room R 0.006
14:00-14:15  Stepwise Reduction Of Functional Spinal Structures Increase Range Of Motion And Change Lordosis Angle #5728
Frank Heuer, Hendrik Schmidt, Lutz Claes, Hans-Joachim Wilke; Institute of Orthopaedic Research and Biomechanics, Univ. of Ulm, Germany

14:15-14:30  Development of a rigid body model to determine the in vivo intersegmental motions of the cervical spine #4734
N. Hoang, M-C. Ho Ba Tho, L. Dürselen, F. Marin; aLaboratoire de Biomécanique et Génie Biomédical CNRS-UMR 6600, Université de Technologie de Compiègne, France; bInstitut für Unfallchirurgische Forschung und Biomechanik, Universität Ulm, Germany

14:30-14:45  The validity assessment of surface markers on measuring the vertebral angles in cervical spine #4236
Shyi-Kuen Wu, Li-Chieh Kuo, Howard Lan, Lin-Hwa Wang, Chuang-Ling Chen, Fong-Chin Su; aInstitute of Biomedical Engineering, bDept. of Occupational Therapy, National Cheng Kung Univ., Tainan, TAIWAN; cDept. of Physical Therapy, HungKuang Univ., Taichung County, TAIWAN; dDept. of Radiology, Taichung Veterans General Hospital, Taichung, TAIWAN

14:45-15:00  Parametric finite element model of lower cervical spine (C3-C7) in sagittal plane #7306
Reza Mapar, Mohammad Haghpaihani, Azad Islamic Univ., Science and Research branch, Tehran, Iran; bIran Univ. of Science and Technology, Tehran, Iran;

15:00-15:15  Ceramic components for the next Generation of mobile spinal Implants #6469
S. Leyen, S. Köbel, W. Weber; Metoxit AG, Thayngen, Switzerland

15:15-15:30  A comparison of three measuring methods to define height changes of vertebrae under axial loading conditions #4571
Christian Haid, Arnold Koller; aUniv. Dept. of Orthopaedics, Medical Univ. of Innsbruck, Innsbruck, Austria; bDept. of Sports Medicine, Medical Univ. of Innsbruck, Innsbruck, Austria

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.5.6 Walking Dynamics
Session Organizers: Dieter Rosenbaum, Fabio Catani
Chairs: Dieter Rosenbaum
Thursday, August 3
Room R0.005
14:00-14:15  A new system for the in-situ recalibration of force platforms #4837
Andrea Cedraro, Lorenzo Chiari, Angelo Cappello; Dept. of Electronics, Computer science & Systems, Univ. of Bologna, Italy

14:15-14:30  Stability analysis of Functional Electrical Stimulation (FES)-assisted overground gait in an incomplete spinal cord injured subject #6680
Anirban Dutta, Dr. Ronald Triolo; Dept. of Biomedical Engineering, Case Western Reserve Univ., Cleveland, USA

14:30-14:45  Modeling of the human gait by means of dynamic software and inverse kinematics: An approach for design of prosthesis #6754
Fernando Vargas, Angélica Ramirez, Diego Garzón, Máximo Roa; Universidad Nacional de Colombia, Bogotá, Colombia

14:45-15:00  Leg design for stable walking and running #7507
Andre Seyfarth, Fumiya Iida, Jürgen Rummel, Hartmut Geyer; aLocomotion Lab, Friedrich-Schiller-Univ. Jena, Jena, Germany; bArtificial Intelligence Laboratory, Univ. of Zurich, Zurich, Switzerland; cBiomechatronics Group, MIT Media Lab, Massachusetts Institute of Technology, Cambridge, MA, USA

15:00-15:15  Mechanical design and testing of a biped robot to reproduce normal and pathological gait patterns from motion capture systems #7389
Rogério Eduardo Silva Santana, Agenor de Toledo Fleury, Luciano Luporini Menegaldo; aPolytechnic School, Mechanical Engineering Dept., Univ. of São Paulo, São Paulo, Brazil; bFEI Univ. Center, Mechanical Engineering Dept., São Bernardo do Campo, Brazil; cMilitary Institute of Engineering, Mechanical and Materials Engineering Dept., Rio de Janeiro, Brazil
15:15-15:30 The Effects of Walking Speed on Orbital Stability of Human Walking #6075
Jonathan B. Dingwell a, Hyun Gu Kang a, Laura C. Marin b; a Dept. of Kinesiology, Univ. of Texas, Austin, Texas, USA; b Amputee Care Center, Brook Army Medical Center, Fort Sam Houston, Texas, USA

4. Implants for Trauma and Orthopedics-Joint ESB Track
4.8.3 Biotribology of Implants - Knee
Chair: Mark Taylor
Thursday, August 3
Room E1.03
14:00-14:15 In vitro wear of unicompartmental knee replacements: the effects of kinematics and femoral condylar lift-off on a fixed bearing design #4480
A. Burton a, H. McEwen b, R. Farrar b, M. Stone c, J. Jennings a, J. Fisher d; a Institute of Medical and Biological Engineering, Univ. of Leeds, Leeds, UK; b DePuy International Ltd., Leeds, UK; c Leeds General Infirmary, Leeds, UK

14:15-15:30 Withdrawn
14:30-14:45 Biotribology of total knee replacement implants – Influence of the tibio-femoral bearing type on delamination risk, abrasive wear generation and in-vitro kinematics #5993
T. M. Grupp a, R. K. Miehlke b, J.-Y. Jenny c, D. Saragagli d, J. Schwiasau e, B. Fritz f, W. Blömer g; a Aesculap AG & CO. KG, Tuttingen, Germany; b Nordwestdeutsches Rheumazentrum St. Josef Stift, Sendenhorst, Germany; c Centre de Traumatologie et d’Orthopédie, Illkirch-Graffenstaden, France; d Centre Hospitalier Sud, Grenoble, France

14:45-15:00 Abrasive wear prediction in knee prostheses: numerical model and experimental validation #6549
Dario Gastaldi, Tomaso Villa, Gabriele Dubini, Laboratory of Biological Structure Mechanics (LaBS), Dept. of Structural Engineering, Politecnico di Milano, Milan, Italy

15:00-15:15 In vitro assessment of wear within the patellofemoral joint of total knee replacements through volumetric analysis #6699
P. Ellison a, D.C. Barton b; c R. Farrar; M.H. Stone a; J. Fisher; Institute of Medical and Biological Engineering, Univ. of Leeds, UK; d DePuy International, Leeds, UK; e Dept. of Orthopaedic Surgery, Leeds General Infirmary, Leeds, UK

15:15-15:30 Processing and testing of functional surfaces of low-wear ceramic implants #4196
Berend Denkena a, Martin Reichstein b, Marijke van der Meer b, Christof Hurschler b, Christina Stukenborg-Colsman b, Sven Ostermeier b; a Institute of Production Engineering and Machine Tools (IFW), Univ. of Hannover, Hannover, Germany; b Laboratory for Biomechanics and Biomaterials (Lbb), Orthopaedic Dept., Medical School of Hannover, Hannover, Germany

5. Occupational and Impact Injury Biomechanics
5.7.1 Extremity and Pedestrian Injury Biomechanics
Chair: Johan Ivarsson
Thursday, August 3
Room R0.058
14:00-14:15 Validated multibody modeling of vehicle/pedestrian impacts to explain the increased Injury risk posed to pedestrians by SUVs #5604
Ciaran Simms a, Denis Wood b, Simms a, Denis Wood b; a Trinity Centre for Bioengineering, Trinity College Dublin, Ireland; b Denis Wood Associates, Dublin, Ireland

14:15-14:30 Mathematical modelling of pedestrian crashes: Parameter study of the influence of the sedan vehicle contour #6435
Anthony Clark a, Clay Douglas a, Brian Fildes a, Astrid Linder b; a Monash Univ. Accident Research Center (MUARC), Melbourne, Australia; b VTI, Göteborg, Sweden

14:30-14:45 Effect of Active Muscles on Knee Ligament Forces During Impact #6321
Anoop Chawla, Anurag Soni and Sudipto Mukherjee; Dept. of Mechanical Engineering, Indian Institute of Technology, New Delhi, INDIA

14:45-15:00 Impact of the Flexed Human Lower Extremity and Posterior Cruciate Ligament Injury: A Comparison to Previous Studies #7564
Adam Bartsch a, John Bolte b, Alan Litsky c, Rodney Herriott b, Joseph McFadden; a The Ohio State Univ., Columbus, OH, USA; b TRC, c VRTC, East Liberty, OH, USA
15:00-15:15 Experimental and Finite Element Evaluation of Bending Loadings in a Lower Limb Bone using Strain Data #7178
Costin Untaroiu, Check Kam, Jeff Crandall; Center for Applied Biomechanics, Charlottesville, VA, USA

6. Sport Biomechanics-Joint ISB Track
6.4.3.2 Skiing
Session Organizers /Chairs: Erich Müller, Veit Senner
Thursday, August 3
Room D2.12
14:00-14:15 Safety binding systems in alpine skiing
14:30-14:45 Mechanics of downhill skiing and snowboarding
15:00-15:15 Performance related biomechanical parameters in ski jumping
   Virmavirta, Mikko
15:15-15:30 From red cells to skiing: a realistic model for lift

7. Dental Biomechanics
7.3 Experimental Testing in Dental Biomechanics - Dental Device Manufacturing and Biomechanical Reliability
Session Organizers: Michel Dalstra, Roberto Contro
Thursday, August 3
Room R1.006
14:00-14:15 Complementary physical and mechanical techniques to characterise tooth: a bone-like tissue #6408
   P. Zioupos and K.D. Rogers; Dept. of Materials & Medical Sciences, Cranfield Univ., Shrinvenham, UK
14:15-14:30 Numerical-experimental models to study the Temporo-Mandibular Joint (TMJ)
   M.Mesnard a, A.Ballu a, A.Ramos b, P.Talaia b, J.A.Simoes b, a Laboratoire Mécanique Physique, Université Bordeaux 1, Bordeaux, France; b Universidade Aveiro, Aveiro, Portugal
14:30-14:45 Experimental and numerical investigations of the wear behaviour of dental telescopic crowns #5024
   Ludger Keilig a,b, Christoph Bourauel b, Martin Hagner a, Stefan Bayer c, Karl-Heinz Utz a, Manfred Grüner a, Helmut Stark c, a Dept. of Preclinical Education and Dental Research and b Dept. of Orthodontics, Dental School, Univ. of Bonn, Bonn, Germany
14:45-15:00 Measuring precisely the orthodontic long-term tooth movement in case of canine retraction with the “Hybrid Retraktor” utilizing macro photogrametry #6280
   Geiger M., Sander F.G.; Univ. of Ulm/Dept. of Orthodontics, Ulm, Germany
15:00-15:15 Withdrawn
15:15-15:30 NiTi finger spreaders result in less root surface strains during lateral condensation #5300
   Tamar Brosh a, Zvi Metzger ab, Raphael Pilo b, Dept. of Oral Biology and a Oral Rehabilitation, School of Dental Medicine, Tel Aviv Univ., Israel

8. Computer-Assisted Surgery
8. 3 Advances in Surgical Navigation
Session Organizers: Klaus Radermacher, Florian Gerhard
Thursday, August 3
Room R1.003
14:00-14:15 Prototype CO2 laser system for osteotomy #6417
   Martin Werner a, Mikhail Ivanenko b, Manfred Klasing a, Peter Hering a,b, a Laser Technology Group, Research Centre Caesar, Bonn, Germany; b Institute of Laser Medicine, Univ. of Düsseldorf, Germany
14:15-14:30 Evaluation of an in-situ visualization system for navigated trauma surgery #7356
   Sandro-Michael Heining a, Philipp Stefan b, Latifa Omary b, Stefan Wiesner b, Tobias Sielhorst b, Nassir Navab a, Frank Sauer c, Ekkehard Euler a, Wolf Mutschler a, Joerg Traub b
9. Tissue Engineering

9.4 Engineered Vascularized Organs

Session Organizer: Melody Swartz

Thursday, August 3

Room R1.004

14:00-14:30

Keynote: Molecular basis for the inhibitory role of elastic laminae #4532
Shu Q. Liu, Brandon J. Tefft, Christopher Tiche, Paul K. Alkema, Andy Zhang, Li-Qun Zhang, and Yu H Wu

14:30-14:45

Design of a Bioreactor System for Tissue Engineering Arteries
Sheng Li, Xin Xu, Nigel B Wood, Alun D Hughes, Simon A Thom, Chemical Engineering, South Kensington Campus, Imperial College London, UK; NHLI, International Centre for Circulatory Health, Imperial College London, UK

14:45-15:00

Evaluation Of 3D UBM (Urinary Bladder Membrane) Extracellular Matrix Vascular Construct Using A Bioreactor Flow Chamber #7489
Callanan A, Morris L, Walsh M, McGlyoughlin T, Gilbert T, G, Badylak S F, Dept. Mechanical and Aeronautical Engineering, Centre for Biomedical Engineering Research, CABER, Univ. of Limerick and MSS, Limerick, Ireland; Dept. Mechanical and Industrial Engineering, Galway Mayo Institute of Technology, Galway, Ireland; McGowan Institute for Regenerative Medicine, Univ. of Pittsburgh, USA

15:00-15:15

Regional Mechanics in an Engineered Tissue Chamber Model of Myocardial Infarction #7590
Eun Jung Lee, Do Eun Kim, Kevin D. Costa, Dept. of Biomedical Engineering, Columbia Univ., New York, USA

10. Cellular and Molecular Mechanics

10.6.1 Microstructural Modeling of Cells

Session Organizers: Fred MacKintosh, Denis Wirtz

Thursday, August 3

Room R.0.056

14:00-14:15

Active filament gels: towards modeling the plant microtubule cytoskeleton # 4586
Bela Mulder, FOM Institute for Atomic and Molecular Physics, Amsterdam, The Netherlands
14:15-14:30 Elastic and dynamic properties of cytoskeletal biopolymer networks: probing microstructure and mechanical response #5353
FC MacKintosh; Dept. of Physics and Astronomy, Vrije Universiteit, Amsterdam, The Netherlands

14:30-14:45 The Biomechanics of Retraction in Nematode Sperm Crawling #4201
Charles W. Wolgemuth; Dept. of Cell Biology, Univ. of Connecticut Health Center, Farmington, CT, USA

14:45-15:00 Actin Network Organization at the Leading Edge of Crawling Cells #6668
S. Sun, D. Wirtz and E. Atilgan; Dept. of Mechanical Engineering and Chemical Engineering, Johns Hopkins Univ., Baltimore, MD, USA

11. Artificial Organs
11.3.2 Artificial Liver
Session Organizers/Chairs: Cecile Legallais, Igor Sauer
Thursday, August 3
Room R1.002

14:00-14:30 Human Bioartificial Livers from Hepatic Stem Cells #7744
W Turnera,b,d, R McClellandad, L Zhangb, E Schmelzerb, E Wauthiere, A Melhema, H Yaoba, N Chenga, J Gerlach, and LM Reidab.”Depts. of Cell and Molecular Physiology and dBiomedical Engineering, UNC School of Medicine, Chapel Hill, NC; *McGowan Institute of Regenerative Medicine, Univ. of Pittsburgh, Pittsburgh, Pennsylvania, USA

14:30-14:45 Evaluation of a hybrid artificial liver with a hepatocytes organoid by applying to a liver failure rat #6176
Hiroshi Mizumoto, Kentaro Aoki, Kohji Nakazawa, Kazumori Funatsu, Toshihisa Kajiwara, a Department of Chemical Engineering, Kyushu Univ., Fukuoka, Japan; b Department of Chemical Processes and Environments, The Univ. of Kitakyushu, Fukuoka, Japan

14:45-15:00 Human Galactosylated Membrane Bioreactor for the Long-term Maintenance of Liver Specific Functions #7367
Loredana De Bartoloa, Sabrina Morelli, Linda C. Lopez, Lidietta Giorno, Giuseppe Barbieri, Simona Salerno, Maria Rende, Efrem Curcio, Alfredo Procino, Pietro Favia, Bruno Memoli, Vittorio E. Andreucci, Riccardo d’Agostino and Enrico Drioli. Institute on Membrane Technology, National Research Council of Italy, ITM-CNR, c/o Univ. Calabria, Rende (CS), Italy; *Dept. of Chemistry, Univ. of Bari, Bari, Italy; †Dept. of Chem. Eng. and Mater., Univ. of Calabria, Rende (CS), Italy; ″Dept. of Nephrology, Univ. “Federico II” of Naples, Naples, Italy

15:00-15:15 Human liver cells in a pilot-scale fluidised-bed bioreactor maintain performance in human liver failure plasma making them suitable for a bioartificial liver #6446
Sam Cowarda, Cecile Legallais, Aude Gautier, Patrick Paulliera, Michael Thomas, Humphrey Hodgson, Clare Selden; †UCL Institute of Hepatology, ‡Clinical Biochemistry, Royal Free & UC Med. School, London, UK, †Université de Technologie de Compiègne, CNRS UMR 6600, Biomécanique et Génie Biomédical, Compiègne, France

15:15-15:30 Development of a microfluidic device for in vitro liver model # 7355
Regis Baudoin, Laurent Griscomb, Cécile Legallais and Eric Leclerc. †CNRS UMR 6600, Laboratoire de Biomécanique et Génie Biomédical, Université de Technologie de Compiègne, France; ‡CNRS UMR 8029, BIOMIS, ENS Cachan, France

12. Biomaterials
12.3.2 Biomaterial in Biomechanical Applications-Joint ESB Session
Session Organizers/Chair: Elizabeth Tanner, Damien Lacroix
Thursday, August 3
Room R1.001

14:00-14:15 Interaction of a novel intervertebral disc substitute with the lumbar spine tissue biomechanics – A Finite Element study #5623
Jérôme Noailly, Damien Lacroix, Josep A. Planell, Elizabeth Tanner, Luigi Ambrosio. *Reference Centre for Bioengineering of Catalonia, Universitat Politècnica de Catalunya, Barcelona, Spain; †Dept. of Materials, Queen Mary Univ. of London, London, UK
14. Cardiovascular Mechanics

14.8.2 Ultrasound and Laser Techniques

Session Organizer: Krystof Kaluzynski

Thursday, August 3
Room G2.36

14:00-14:15 Objective assessment of fetal activity #7377
Krzysztof Kaluzynski, Krzysztof Czajkowski, Tomasz Kret, Jacek Sieńko, Beata Leśniak, Tadeusz Pako.

14:15-14:30 Ultrasound investigation of lower limb haemodynamics during compression using a water-filled cuff #5064

14:30-14:45 New method for discriminating emboli from micro-bubbles in blood flow using ultrasound Doppler velocimetry #7381
Kenkichi Ohba, Yuichi Abe, Katsunori Yamamoto and Tsutomu Tajikawa.

14:45-15:00 Effect of training on endothelial function of cutaneous microcirculation in rats #5874
Erwan Heylen, Jacques Mansourati, Bernard Safa, Samir Thioub, Francois Guerrero.

15:00-15:15 Wavelet Analysis of the Effects of Static Magnetic Field on Skin Blood Flowmotion: Investigation Using an in vivo Rat Model #4967
Zengyong Li, Eric W.C. TAM, Arthur F.T. MAK, Dept. of Healthy Technology & Informatics, The Hong Kong Polytechnic Univ., Kowloon, Hong Kong, P.R. China

15:15-15:30 Measurement of Shear Stress on Endothelium in a Flow Chamber and its Gene Expression Response #5762
### 14. Cardiovascular Mechanics

#### 14.9.1 Heart Valves and Protheses

**Session Organizers /Chairs:** Kristen Billiar, Ajit Yoganathan  
**Thursday, August 3**  
**Room G1.27**

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<tr>
<td>14:15-14:30</td>
<td>Computation of Closure Forces for Mechanical Heart Valves # 5189</td>
<td>Lawfrod PV, Narracott AJ, Diaz V, Hose DR; Academic Unit of Medical Physics, Univ. of Sheffield, Royal Hallamshire Hospital, Sheffield, UK</td>
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<tr>
<td>14:30-14:45</td>
<td>Reduction of the Pro-Coagulant Potential of Bileaflet Mechanical Heart Valves using Passive, Surface-Mounted Elements #6670</td>
<td>Lakshmi P. Dasi, David W. Murphy, Helene A. Simon, Ari Glezer, and Ajit P. Yoganathan Wallace H. Coulter Dept. of Biomedical Engineering, Georgia Institute of Technology and Emory Univ., Atlanta, GA, USA; Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA, USA; School of Chemical and Biomolecular Engineering, Georgia Institute of Technology, Atlanta, GA, USA</td>
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<tr>
<td>14:45-15:00</td>
<td>Experimental Studies of Mechanical Heart Valves in Pulsatile Circulatory Support Devices #6045</td>
<td>Keefe B. Manning, Brandon D. Wivholm, James W. Kreider, Arnold A. Fontaine, Steven Deutsch; Dept. of Bioengineering, The Pennsylvania State Univ., Univ. Park, PA, U.S.A.</td>
</tr>
<tr>
<td>15:00-15:15</td>
<td>In-vitro Characterization of Flow through Mechanical Heart Valves #6136</td>
<td>Lakshmi P. Dasi, Helene Simon, Liang Ge, Fotis Sotiropoulos, and Ajit Yoganathan Wallace H. Coulter Dept. of Biomedical Engineering, Georgia Institute of Technology and Emory Univ., Atlanta, GA, USA; School of Chemical and Biomolecular Engineering, Georgia Institute of Technology, Atlanta, GA, USA; Saint Anthony Falls Laboratory, Univ. of Minnesota, Minneapolis, MN, USA</td>
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### 14. Cardiovascular Mechanics

#### 14.12.2 Tissue Adaptation and Remodelling

**Session Organizers:** Ray Vito, Hans Gregersen  
**Thursday, August 3**  
**Room G0.01**

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<td>14:00-14:15</td>
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<td>14:15-14:30</td>
<td>Reduced Axial Strain Disrupts Normal Arterial Homeostasis, Mechanoreponsiveness, And Vasoreactivity #6065</td>
<td>Amanda R. Lawrence, Keith J. Gooch; Dept. of Bioengineering and Institute for Medicine and Engineering, Penn, Philadelphia, PA, USA; Dept. of Biomedical Engineering, Ohio State Univ., Columbus, OH, USA</td>
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<tr>
<td>14:30-14:45</td>
<td>A Comparison of Cell Proliferation in Arteries under Hypertensive Pressure and Longitudinal Stretch #6359</td>
<td>H.C. Han, Y. Lee, R. P. Vito, and E.A. Sprague; Dept. of Mechanical Engineering, Univ. of Texas at San Antonio, TX, USA; Biomedical Engineering Program, UTSA-</td>
</tr>
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</table>
14:45-15:00 **Mechano-control of tissue properties in cardiovascular engineered constructs #4787**  
Ralf A. Boerboom, Niels J.B. Driessen, Carlijn V.C. Bouten, Frank P.T. Baaijens  
Dept. of Biomedical Engineering, Eindhoven Univ. of Technology, Eindhoven, The Netherlands

15:00-15:15 **Effect of circumferential and shear stress on collagen synthesis in arteries in organ culture #5166**  
Brian Wayman, Raymond P. Vito, Alexander Rachev; Georgia Institute of Technology, The George W. Woodruff School of Mechanical Engineering, Atlanta, GA, USA

15:15-15:30 **Myocardial injury among participants in endurance sports – a model to study myocardial regeneration? # 4982**  
Arnold Koller, Christian Haid; 4Dept. of Sports and Circulatory Medicine, Medical Univ. of Innsbruck, Innsbruck, Austria 5Univ. Dept. of Orthopedics, Medical Univ. of Innsbruck, Innsbruck, Austria

14:00-14:15 **Countercurrent Discrete Vessel Heat Transfer Models for Perfused Tissue – Model Comparison #5050**  
Maciej Stańczyk; Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland

14:15-14:30 **Modeling the thermal conditions around sites of microwave drilling in bone #4704**  
Ronit R. Mann, Oleg Aktushev, Eli Jerby; Depts. of 8Biomedical Engineering and 9Physical Electronics, Tel Aviv Univ., Israel

14:30-14:45 **Numerical Simulation of Human Head Cooling with Icepack # 5536**  
N. Fatourae, A. Pashaee, and M. Nabaei; Biological Fluid Mechanics Laboratory, Biomedical Engineering Faculty, Amirkabir Univ. of Technology, Tehran, Iran

14:45-15:00 **The Application of the Evolutional Conway Game for the Analysis of Non-Linear Biodynamical Phenomena #4590**  
Tadeusz Pyrcioch; Univ. College of Environmental Sciences, Radom, Poland

15:00-15:15 **Improvement of the cryopreservation of 293T-cell seeded 3D collagen scaffolds #6530**  
Bernemann, M. Kuberka, A. Petersen, B. Glasmacher; Cryobiology & Biomaterials, RWTH Aachen Univ., Aachen, Germany

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**Biotransport**

**19.8.1 Bioheat Transfer**

**Session Organizers /Chairs:** Hiroshi Ishiguro, Birgit Glasmacher  
**Thursday, August 3**

**Room R0.003**

14:00-14:15 **Countercurrent Discrete Vessel Heat Transfer Models for Perfused Tissue – Model Comparison #5050**  
Maciej Stańczyk; Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland

14:15-14:30 **Modeling the thermal conditions around sites of microwave drilling in bone #4704**  
Ronit R. Mann, Oleg Aktushev, Eli Jerby; Depts. of 8Biomedical Engineering and 9Physical Electronics, Tel Aviv Univ., Israel

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Bernemann, M. Kuberka, A. Petersen, B. Glasmacher; Cryobiology & Biomaterials, RWTH Aachen Univ., Aachen, Germany

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**Thread 1: Computational Methods in Biomechanics and Mechanobiology**

**T1.5 Computational Biomechanics and Mechanobiology of the Heart**

**Session Organizer:** Pascal Verdonck  
**Thursday, August 3**

**Room G0.43**

14:00-14:15 **Flow and blood shear stress in a chicken embryonic heart, experiments and numerical modeling #7686**  
M. Pourquie, F. Nieuwstadt, P. Vennemann, J. Westerweel, R. Lindken, R. Poelmann, B. Groenendijk, S. Stekelenburg-DeVos, N. Ursem; 8Laboratory for Aero- and Hydrodynamics, Delft Univ. of Technology, Delft, Netherlands; 9Leiden Univ. Medical Center, Leiden, Netherlands; 10Erasmus Univ., Rotterdam, Netherlands

14:15-14:30 **Multiscale modelling of cardiac mechanics #4933**  
David Nickerson, Carey Stevens, Martyn Nash, Peter Hunter; Bioengineering Institute, The Univ. of Auckland, Auckland, New Zealand
14:30-14:45 Multi-scale and multi-physical computational biomechanics of left ventricle and aorta in health and disease #4559  
H. Liu, F.Y. Liang, K. Oka, and M. Taniguchi; Chiba Univ., JAPAN

14:45-15:00 Mechanical evaluation of cardiac function in heart with disease by numerical simulation #5792  
Masakazu Tsutsumi, Kazuyuki Yanagisawa, Tadashi Inaba; Masataka Tokuda; aGraduate School of Engineering, Mie Univ., Tsu, Japan; b Dept. of Mechanical Engineering, Mie Univ., Tsu, Japan

15:00-15:15 Velocity Tracking – a Novel Method for Quantitative Analysis of Longitudinal Myocardial Function #7197  
Matilda Larsson, Anna Bjällmark, Reidar Winter, Carl Westholm, Per Jacobsen, Britta Lind, Lars-Åke Brodin; a School for Technique and Health, Royal Institute of Technology, Flemingsberg, Stockholm, Sweden; b Dept. of Clinical Physiology, Karolinska Univ. Hospital, Huddinge, Stockholm, Sweden

15:15-15:30 Reconstruction of a 4D heart from CT images # 6214  
Tomer Anor, Jacob Sosna, Alexander Yakhot, George Karmiadakis, Eugene Libson; a Dept. of Mechanical Engineering, Ben-Gurion Univ., Beersheva, Israel; b Dept. of Radiology, Hadassah Med. Center, Ein Kerem, Jerusalem, Israel; c Division of Applied Mathematics, Brown Univ., Providence, RI, USA

Thread 1: Computational Methods in Biomechanics and Mechanobiology  
T1.9.3 Computational Bone Mechanobiology: Remodelling, Healing, Growth and Osteointegration  
Session Organizers: Manuel Doblaré, Jan Herman Kuiper  
Thursday, August 3  
Room R1.007

14:00-14:15 Three-dimensional bone adaptation – a hierarchical model #4355  
P. G. Coelho, P. R. Fernandes, J. B. Cardoso, J. M. Guedes, and H. C. Rodrigues; a DEMI, FCT/UNL, Caparica, Portugal; b IDMEC- IST, Lisboa, Portugal

14:15-14:30 A FE algorithm for spine growth and growth modulation #6529  
P. Büchler, A. Lindberg and S. Olsen; MEM Research Center, Univ. of Bern, Switzerland

14:30-14:45 Optimisation of Scaffold Porosity using a Stochastic Model for Cell Proliferation and Migration in Mechanobiological Simulations #4856  
Damien P. Byrne, Patrick J. Prendergast, and Daniel J. Kelly; Centre for Bioengineering, Dept. of Mechanical Engineering, Trinity College Dublin, Ireland

14:45-15:00 3D Simulation of Damage Repair along a Single Trabecular Strut #5690  
Brianne. M. Mulvihill, Laoise. M. McNamara, Patrick J. Prendergast; a Centre for Bioengineering, Trinity College Dublin, Ireland; b Dept. of Mechanical Engineering, National Univ. of Ireland, Galway, Ireland

15:00-15:15 Simulation of bone adaptation in rat tibiae based on a local criterion #5941  
J.C. van der Linden, J.H. Waarsing, H. Weinans; Dept. of orthopaedics, Erasmus Medical Center, Rotterdam, The Netherlands

15:15-15:30 Orthodontic tooth movement: Mechanical stimulus, cellular reactions and numerical bone remodeling simulation #5798  
Christoph Bourauel, Afshar Kawarizadeh, Werner Götz, Andreas Jäger; Dept. of Orthodontics, Univ. of Bonn, Germany

Thread 4: Imaging  
T4.2 New Imaging Advancements in Musculoskeletal Systems and Performance  
These presentations are in conjunction with Track 3 Musculoskeletal Systems and Performance  
Session Organizers: Frances Sheehan, Christof Hurschler  
Room R2.007

14:00-14:30 Keynote: Quantitative imaging technology for the musculoskeletal system #5652  
Felix Eckstein; Institute of Anatomy and Musculoskeletal Research, Paracelsus Private Medical Univ. Salzburg, Austria

14:30-14:45 A robotic radiographic imaging platform for observation of dynamic skeletal motion and tomography #5968
Scott A. Banks\textsuperscript{a,b}, Christopher Lightcap\textsuperscript{a}, J.D. Yamkoski\textsuperscript{a}; \textsuperscript{a}Depts. of Mechanical & Aerospace Engineering and \textsuperscript{b}Orthopaedics and Rehabilitation, Univ. of Florida, Gainesville, Florida, United States of America

\textbf{14:45-15:00 Noninvasive Measurement of Ligament Strain Using Deformable Image Registration \#6003}
Nikhil S. Phatak\textsuperscript{a}, Qunli Sun\textsuperscript{a}, SE Kim\textsuperscript{b}, Dennis L. Parker\textsuperscript{a}, R. Kent Sanders\textsuperscript{b}, Alexander I. Veress\textsuperscript{c}, Jeffrey A. Weiss\textsuperscript{c}; \textsuperscript{a}Depts. of Bioengineering and \textsuperscript{b}Radiology, Univ. of Utah, Salt Lake City, Utah, USA

\textbf{15:00-15:15 Developing Dynamic MRI Based tools for the Understanding of Musculoskeletal Function at the Joint-Impairment Level \#6292}
Frances T. Sheehan and Andrea R. Seisler; National Institutes of Health, Bethesda, MD, USA

\textbf{Thursday, Aug. 3}
\textbf{16:00-17:30}

\textbf{1. Bone Mechanics – Joint ESB Track}
\textbf{1.5.4 Bone Tissue IV}
\textbf{Chair:} Ed X. Guo, Harry van Lenthe

\textbf{Thursday, Aug. 3}
\textbf{Room R0.055}
\textbf{16:00-16:15 Wistar rat cortical bone from growth to senescence: Correlation of mechanical, morphologic and physical chemical properties\# 5761}
Maximilien Vanleene\textsuperscript{a}, Christian Rey\textsuperscript{a}, Marie-Christine Ho Ba Tho\textsuperscript{a}
\textsuperscript{a}Laboratoire de Biomécanique et génie Biomédical,CNRS-UMR 6600, Université de Technologie de Compiègne, France; \textsuperscript{b}Centre Inter-Universitaire de Recherche et d’Ingénierie des Matériaux, CNRS-UMR 5085, ENSIACET-INPT, Toulouse, France

\textbf{16:15-16:30 Modelling Cortical Bone Using the Method of Asymptotic Homogenization \#4709}
W.J. Parnell\textsuperscript{a}, Q. Grimal \textsuperscript{b}, I.D. Abrahams \textsuperscript{a}, P. Laugier \textsuperscript{b}; \textsuperscript{a} School of Mathematics, Univ. of Manchester, Manchester, UK.; \textsuperscript{b} Laboratoire d’Imagerie Paramétrique, Université Pierre et Marie Curie Paris 6; UMR CNRS 7623, Paris, France.

\textbf{16:30-16:45 Ageing of compact bone tissue \#5311}
I. Knets, V. Vitins, M.Dobelis; Institute of Biomaterials and Biomechanics of the Riga Technical Univ., Riga, Latvia

\textbf{16:45-17:00 Viscoelastic/Plastic Finite Element Simulation of Nanoindentation Mechanical Properties of Bone \#6089}
Jingzhou Zhang, Glen Niebur and Timothy Ovaert; Dept. of Aerospace and Mechanical Engineering, Univ. of Notre Dame, Notre Dame, IN, USA

\textbf{17:00-17:15 Minimal size of structural \textmu FE models of trabecular bone to predict the apparent stiffness \#7531}
Ulrich Simon, Joerg Abel, Uwe Wolfram, Lutz Claes; Institute of Orthopaedic Research and Biomechanics, Univ. of Ulm, Germany

\textbf{17:15-17:30 Significance of cancellous bone orthotropy and non-homogeneity in femoral head \#4745}
Jiri Bursa, Pavel Kuzela; Inst. of Solid Mechanics, Mechatronics and Biomechanics, Brno Univ. of Technology, Brno, Czech Rep.

\textbf{2 Musculoskeletal Mechanics-Joint ISB Track}
\textbf{2.5.4 Muscle Mechanics (Cellular and Molecular muscle mechanics)}
\textbf{Session Organizers:} Frank Baaijens, Jack Winter, Dilson Rassier
\textbf{Chair:} Dilson Rassier

\textbf{Thursday, August 3}
\textbf{Room R1.049}
\textbf{16:00-16:15 Mechanical diversity of titin and its relation to passive and active contractile properties of skeletal muscles \#4798}
Wolfgang A. Linke; Physiology and Biophysics Unit, Univ. of Muenster, Germany

\textbf{16:15-16:30 Titin-like Ig/FN3 domains can refold fast and even under substantial force \#4800}
Wolfgang A. Linke\textsuperscript{a}, Belinda Bullard\textsuperscript{a}, Mark L. Leake\textsuperscript{a}, Andres F. Oberhauser\textsuperscript{d}
3.3.1 Neuromuscular Control-Joint ISEK Session

Session Organizers: Catherine Disselhorst-Klug, Hermi Hermens

Thursday Aug. 3
Room R1.046

16:00-16:15 Chronic Ankle Instability in the Swiss Orienteering National Team #6732
Leumann André, Valderrabano Victor, Marti Bernard, Hintermann Beat; Orthopaedic Dept., Univ. Hospital of Basel, Basel, Switzerland

16:15-16:30 Task instability reduces maximum voluntary forces in dynamic multi-fingered grasp #6917
Daniel Brown and Francisco J. Valero-Cuevas; Neuromuscular Biomechanics Laboratory, Cornell Univ., Ithaca, USA

16:30-16:45 Movement frequency and FES powered work #7523
Jesse Dean, David Collins; Human Neurophysiology Laboratory, Univ. of Alberta, Alberta, Canada

16:45-16:00 Learning control for best dynamic performance #5960
Petko Kiriazov; Institute of Mechanics and Biomechanics, Bulgarian Academy of Sciences, Sofia, Bulgaria

17:00-17:15 The nervous system transitions rapidly between incompatible control strategies by predictively exploiting the margins of error of the task #7142
Francisco J. Valero-Cuevas, Robert V. McNamara III, Veronica J. Santos, Madhusudhan Venkadesan, Stanley Song and Karen Grace-Martin; "Neuromuscular Biomechanics Laboratory, Cornell Univ., Ithaca, NY, USA; "Office of Statistical Consulting, Cornell Univ., Ithaca, NY, USA

17:15-17:30 Sensorimotor Control of the Knee in Male and Female Athletes # 7555
Williams GN, Krishnan C, Patil S, Amendola A; "Graduate Program in Physical Therapy & Rehabilitation Science, Univ. of Iowa Sports Medicine Center, Univ. of Iowa, Iowa City, IA, USA

4. Implants for Trauma and Orthopedics-Joint ESB Track

4.8.4 Biotreology of Implants -General

Chair: Zhongmin Jin

Thursday, August 3
Room E1.03
Development of a wear test for cartilage replacement materials #7505
Pacione C, Wimmer MA, Thonar EJ, Block JA; Rush Univ. Medical Center, Chicago, IL, USA

Computational Modelling and Experimental Measurement of Effect of Cross-Shear on Wear of Polyethylene #4120
a) Kang L;  b) Galvin AL;  c) Jin ZM and  d) Fisher J;  a) b) Institute of Medical and Biological Engineering, Univ. of Leeds, Leeds, UK

Influence of dissolved oxygen in lubricating liquid on tribological characteristics of metallic bearing for artificial joints #5631
Yoshitaka Nakanishi, Ryouta Hoshino, Tatsuki Takashima, Hidehiko Higaki, Takatoshi Umeno, Hiromasa Miura, Yuhiide Iwamoto; Digital Medicine Initiative, Kyushu Univ., Fukuoka, Japan; Dept. of Mechanical Engineering, Kyushu Sangyo Univ., Fukuoka, Japan; Venture Business Laboratory, Niigata Univ., Niigata, Japan

Experimental and numerical investigation of wear in the total shoulder arthroplasty #7376
W. Swieszkowska, H. E. N. Bersee, K. J. Kurzydlowski; Faculty of Materials Science and Engineering, Warsaw Univ. of Technology, Warsaw, Poland; Faculty of Aerospace Engineering, Delft Univ. of Technology, Delft, Netherlands

Evaluation of clavicle geometry influence during dynamic compression #4341
Sonia Duprey, Karine Bruyère, François Cotton; Biomechanics and Human Modeling Laboratory, Institut National de Recherche sur les Transports et leur Sécurité, Bron, France; Service de radiologie, Centre hospitalier Lyon-Sud, Lyon, France.

Biomechanical analyses of falls onto the outstretched hand #5455
Mike Jones and Nici Gittens; Cardiff School of Engineering, Cardiff Univ., Cardiff, Wales, UK

Numerical Human Body Model to Predict Human Shoulder Impact Response #7062
P.A. Forbes, D.S. Cronin, Y.C. Deng; TNO Science and Industry, Automotive, Delft, Netherlands; Univ. of Waterloo, Waterloo, ON, Canada; General Motors Corporation, Warren MI, USA

Review of Vehicle Impact Induced Carpal Tunnel Injury Mechanisms #7671
John Wiechel, Doug Morr, Andrew MacDowell; The Ohio State Univ., Columbus, Ohio, USA; 

Effects of ski and snow properties on the turning of Alpine skis – A computer simulation #6900

5. Occupational and Impact Injury Biomechanics
5.7.2 Extremity and Pedestrian Injury Biomechanics
Chair: Johan Ivarsson

Thursday, August 3
Room R0.058
16:00-16:15  Evaluation of clavicle geometry influence during dynamic compression #4341
Sonia Duprey, Karine Bruyère, François Cotton; Biomechanics and Human Modeling Laboratory, Institut National de Recherche sur les Transports et leur Sécurité, Bron, France; Service de radiologie, Centre hospitalier Lyon-Sud, Lyon, France.

Biomechanical analyses of falls onto the outstretched hand #5455
Mike Jones and Nici Gittens; Cardiff School of Engineering, Cardiff Univ., Cardiff, Wales, UK

Numerical Human Body Model to Predict Human Shoulder Impact Response #7062
P.A. Forbes, D.S. Cronin, Y.C. Deng; TNO Science and Industry, Automotive, Delft, Netherlands; Univ. of Waterloo, Waterloo, ON, Canada; General Motors Corporation, Warren MI, USA

Review of Vehicle Impact Induced Carpal Tunnel Injury Mechanisms #7671
John Wiechel, Doug Morr, Andrew MacDowell; The Ohio State Univ., Columbus, Ohio, USA; 

6. Sport Biomechanics-Joint ISB Track
6.5 Technology and Equipment
Session Organizers: Darren Stefanyshyn, W. Nachbauer
Thursday, August 3
Room D2.12
16:00-16:15  Effects of ski and snow properties on the turning of Alpine skis – A computer simulation #6900
Werner Nachbauer, Peter Kaps, Dieter Heinrich, Martin Mössner, Kurt Schindelweig, and Herwig Schretter; a Dept. of Sport Science, Univ. of Innsbruck, Austria; b Dept. of Engineering Mathematics, Geometry, and Computer Science, Univ. of Innsbruck, Austria; c HTM Tyrolia, Schwechat, Austria

16:15-16:30 **Kinetics of the Skateboarding Kick Flip** #6349
Jeremy Determan, Edward Frederick, Joseph Cox, Matt Nevitt; a Sole Technology Institute, Lake Forest, CA USA; b Exeter Research, Inc., Brentwood, NH USA

16:30-16:45 **Soccer Ball Trajectory Simulation** #5099
Sarah Barber, Steve J. Haake, Matt J. Carré; Sports Engineering Research Group, Dept. of Mechanical Engineering, Sheffield, U.K.

16:45-16:00 **Decoupling of the tennis racket frame decreases grip vibrations** #7715
Gert-Peter Brüggemann, Wolfgang Potthast; Institute of Biomechanics and Orthopaedics, DSHS-Cologne, Germany

17:00-17:15 **Functionality of Playing Surfaces** #6562
Sarah Dixon, Victoria Stiles and Iain James; a Univ. of Exeter, Devon, UK; b Cranfield Univ., Beds., UK

17:15-17:30 **Energy return and puck speed of hockey sticks** #6622
Darren J. Stefanyshyn, Jay T. Worobets; Human Performance Laboratory, Univ. of Calgary, Calgary, Canada

8. **Computer-Assisted Surgery**
8.4 **Robotics in Surgery and Rehabilitation**
Session Organizers/Chair: Gerd Hirzinger, Robert Riener

**Thursday, August 3**

**Room R1.003**

16:00-16:15 **Multimodal patient-cooperative rehabilitation robotics** #7758
Robert Riener; Rehabilitation Engineering Group, ETH and Univ. Zurich, Switzerland

16:15-16:30 **Motion Estimation for Gait Rehabilitation of Hemiplegic Patients using Principal Components Analysis** #7768
H. Vallery, M. Buss; Lehrstuhl für Steuerungs- und Regelungstechnik, Technische Universität München, Munich, Germany

16:30-16:45 **Development of Actuated and Sensor Integrated Forceps for Minimally Invasive Robotic Surgery** #5848
Ulrich Seibold, Bernhard Kübler, Georg Passig, and Gerd Hirzinger; German Aerospace Center (DLR), Institute of Robotics and Mechatronics, Oberpfaffenhofen, Wessling, Germany

16:45-16:00 **An Overview of the Acrobot Robotic Surgical System for Minimally Invasive Unicompartmental Knee Arthroplasty** #6496
Brian Davies, Ferdinando Rodriguez, Simon Harris, Matjaz Jakoepe, Adrian Barrett, Paula Gomes, Justin Cobb; The Acrobot company limited, Leathermarket, London, UK; The Acrobot company limited, Leathermarket, London, UK; The Acrobot company limited, Leathermarket, London, UK

17:00-17:15 **An examination of the cutting forces in drilling / milling procedures on model bone material as the basis for setting up a semi-active robot arm** #7098
Döbele S., Weiss H., Ortmair T., Schreiber U.; Clinic of Orthopedics, Technical Univ. Munich, Germany; Institute of Robotics and Mechatronics, German Aerospace Center, Oberpfaffenhofen, Germany

17:15-17:30 **Dynamic Stability of Machine-Tissue Contacts in Force-Feedback Systems** #7554
J. Kövecses, L. Kovácsb and G. Stépánb; a Dept. of Mechanical Engineering, McGill Univ., Montreal, Canada; b Dept. of Applied Mechanics, Budapest Univ. of Technology and Economics, Hungary

9. **Tissue Engineering**
9.5 **Mechanobiology at Micro- and Nano-Scale Levels**
Session Organizer/Chair: Takashi Ushida

**Thursday, August 3**
5th World Congress of Biomechanics

Room R1.004
16:00-16:15 Simultaneous Spatio-temporal Measurements of Calcium-Inositol 1,4,5-Triphosphate Dynamics in response to Mechanical Stimulation #6762
Yasunori Hayashida, Katsuko Furukawa, Takashi Ushida; Biomedical Engineering Laboratory, Graduate School of Engineering, Center for Disease Biology and Integrative Medicine, School of Medicine, Univ. of Tokyo, Tokyo, Japan

16:15-16:30 Shear flow induces cytoskeleton stiffening as revealed by intracellular nanorheology #4619
Denis Wirtz and Jerry S.H. Lee; "Dept. of Chemical and Biomolecular Engineering, Johns Hopkins Univ., Baltimore, USA; "Howard Hughes Medical Institute graduate training program, Johns Hopkins Univ., Baltimore, USA

16:30-16:45 Effects of laminar and disturbed flows on proliferation of the cells of a hybrid vascular graft in vitro #4654
Takeshi Karino, Lijie Fan, Xiaoming He; Research Institute for Electronic Science, Hokkaido Univ., Sapporo, Japan

16:45-16:00 Effects of extracellular matrix architecture on cell shear stress under interstitial flow #4829
John A. Pedersen, Federica Boschetti, Melody A. Swartz; "Dept. of Biomedical Engineering, Northwestern Univ., Evanston, IL, USA; "Dept. of Structural Engineering, Politecnico di Milano, Milan, Italy; "Institute of Bioengineering, École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

17:00-17:15 Rearrangement of Collagen in Cartilage under Tensile Load #4369
Yoshihiro Sasazaki, Roger C. Shore, Bahaa B. Seedhom; "National Hospital Organization Murayama Medical Centre, Japan; "Univ. of Leeds, U.K.

17:15-17:30 Effects of Stiffness and Sequence of Three-Dimensional Ionic Self-Assembling Peptide Gels on Capillary Morphogenesis #5316
A.L. Sieminski, A.S. Was, G. Kim, H. Gong, C.E. Semino, and R.D. Kamm; "Biological Engineering Division, MIT, Cambridge, MA, USA; "Franklin W. Olin College of Engineering, Needham, MA USA; "Dept. of Mechanical Engineering, MIT, Cambridge, MA, USA; "Ophthalmology Dept., Boston Univ. School of Medicine, Boston, MA, USA

10. Cellular and Molecular Mechanics
10.6.2 Microstructural Modeling of Cells
Session Organizers: Fred Macintosh, Denis Wirtz
Thursday, August 3
Room R.0.006
16:00-16:15 Pushing the limit: On building an artificial lamellipodium #4769
Björn Stuhrmann, Florian Huber, Josef Käs; "Institute for Soft Matter Physics, Univ. of Leipzig, Leipzig, Germany

16:15-16:30 Actin-binding proteins sensitively mediates actin bundle stiffness #5131
Mark Bathe, Mireille Claessens, Erwin Frey, Andreas Bausch; "Ludwig Maximilian Univ., Munich, Germany; "Technical Univ. of Munich, Munich, Germany

16:30-16:45 Computational study of rheological properties and spontaneous fluctuations of particles within a prestressed cytoskeletal network #5347
C. Metzner and B. Fabry; Zentrum für Medizinische Physik und Technik, Universität Erlangen, Erlangen, Germany

16:45-17:00 Deformability and mechano-sensing in a cytoskeleton model with forced protein unfolding #7485
John C. Crocker, Brenton D. Hoffman, Gladys Massiera; "Dept. of Chemical and Biochemical Engineering; "Institute for Medicine and Engineering, Univ. of Pennsylvania, Philadelphia, PA, USA

17:00-17:15 Dynamical reorganization of the cytoskeleton during cell deformation analyzed by a divided medium based model #7078
Sylvie Wendling-Mansuy, Jean Louis Milan, Michel Jean, Patrick Chabrand; "CNRS, LABM USR 2164 Université de la Méditerranée, 13288 Marseille cedex 09; "CNRS, LMA UPR 7051, 13402 Marseille, cedex 20, France
10. Cellular and Molecular Mechanics
10.7.1 Molecular Biomechanics: Biomechanics at Micro- And Nanoscale Levels
Session Organizers /Chairs: Masaaki Sato, X. Edward Guo
Thursday, August 3
Room R0.056
16:00-16:15 Modeling and simulations on self-assembly and mechanics of biomolecular chains #6707
Baohua Ji; Dept. of Engineering Mechanics, Tsinghua Univ., Beijing, China
16:15-16:30 CSF Outflow Mechanism Through Human Arachnoid Granulations #6910
Deborah M. Grzybowskiab, David W. Holmanc, Shelly A. Glimcherb, Steven E. Katza
aOphthalmology, bBiomedical Engineering, The Ohio State Univ., Columbus, Ohio, USA
16:30-16:45 Molecular interactions of tight junction proteins in cell-cell adhesion #4246
Lim C.Ta, Vedula S.R.K.a, T.S. Limb, Kausalya P.J.c, Gunaretnam R.b, Hunziker W.c
bBioinformatics Institute, Singapore; cInstitute of Molecular & Cell Biology, Singapore.
16:45-16:00 Real Time Analysis of Cell-Surface Adhesive Interactions Using TSM Sensor #5894
Kenneth A. Barbee, Soonjin Hong, Ertan Ergezen, Sunjong Kwoun, and Ryszard Lec
School of Biomedical Engineering, Science and Health Systems, Drexel Univ., Philadelphia, USA
17:00-17:15 Quaternary uncoiling dynamics of type I fimbiae suggest regulatory mechanism for bacterial adhesion #6486
Manu Forero ab, Wendy E. Thomas c, Evgeni V. Sokurenko ad, Viola Vogel a
bLaboratory for Biologically Oriented Materials, Dept. of Materials, Swiss Federal Institute of Technology (ETH), Zürich, Switzerland, and Depts. of cPhysics, dBioengineering and Microbiology, Univ. of Washington, Seattle, USA

11. Artificial Organs
11.4.1 Artificial Lungs and Oxygenators
Session Organizers: Lyle Mockros, Joseph Zwischenberger
Thursday, August 3
Room R1.002
16:00-16:30 Keynote: The Medical Need for Artificial Lungs
Josef Zwischenberger
16:30-16:45 How well matches current oxygenator design the needs of the physician? #5451
Filip De Somer; Centre for Cardiac Surgery, Univ. Hospital Gent, Gent, Belgium
16:45-17:00 Progress with the Pediatric Cardiopulmonary Assist System #5217
Mark Gartnera, Greg Johnsona and George Pantalosb; aEnsion, Inc., Pittsburgh, Pennsylvania, USA; bUniv. of Louisville, Louisville, Kentucky, USA
17:00-17:15 Computational Design and Experimental Evaluation of an Integrated Blood Pump-Oxygenator #7280
Zhongjun J Wu, Juntao Zhang, Tim DC Nolan, Tao Zhang, Bartley P Griffith; Artificial Organs Laboratory, Dept. of Surgery, Univ. of Maryland, Baltimore, Maryland, USA
17:15-17:30 Highly Integrated Intravascular Membrane Oxygenator (HIMOX): Where Are We Now? #6392
F Westhoffa, GF Cattaneob, M Sprangerb, T Schmitz-Rodec, aHelmholtz Institute for Biomedical Engineering, Univ. Aachen, Germany, bNovalung GmbH, Hechingen, Germany

14. Cardiovascular Mechanics
14.8.3.2 Laser Techniques
Session Organizers /Chairs: Kenkichi Ohba, Dieter Liepsch
Room G2.36
16:00-16:15 Impact of Inlet Velocity Profile on Stenotic Flow Development #7135
Sean D. Peterson, Stephane Poussou, Michael W. Plesniak ; Maurice J. Zucrow Laboratories, Purdue Univ., West Lafayette, IN, USA
16:15-16:30 3-D Stereo-Particle Image Velocimetry in the Total Cavopulmonary Connection #7561
14. Cardiovascular Mechanics

14.9.2 Heart Valves and Protheses

Session Organizers: Kristen Billiar, T. Umezu, Ajit Yoganathan
Chair: Kristen Billiar
Room G1.27

16:00-16:15 The Geometry Of The Native Mitral Valve Optimizes Leaflet And Sub-Valvular Mechanics #6052
Jorge H. Jimenez, Shasan W. Liou, Muralidhar S. Padala, Rachmadian Wulandana, Ajit P. Yoganathan; Wallace H. Coulter Dept. of Biomedical Engineering at Georgia Institute of Technology and Emory Univ., Atlanta, USA

16:15-16:30 Mitral Valve Mechanics #5414
Zhaoming He; Dept. of Mechanical Engineering, Texas Tech Univ., Lubbock, TX, USA

16:30-16:45 Regional dynamic strains of the native aortic valve #7509
Diana M. Gaitán and Michael Sacks; Dept. of Bioengineering, Univ. of Pittsburgh, USA

16:45-16:00 Biaxial mechanical behavior of the aortic valve under physiologic loading conditions #7512
John A. Stella, Michael S. Sacks; Engineered Tissue Mechanics Laboratory, Dept. of Bioengineering and the McGowan Institute for Regenerative Medicine, Univ. of Pittsburgh, Pittsburgh, Pennsylvania

17:00-17:15 pH Controlled Accelerated Dynamic in vitro Calcification Study of Porcine Heart Valve Bioprostheses #6600
Cord-F., Koenig, Martin Kringsa, Dimosthenis Mavrilasb, Birgit Glasmacherb
a Helmholtz Institut for Biomedical Engineering, Cryobiology & Biomaterials, RWTH Aachen Univ., Aachen, Germany; b Laboratory of Biomechanics, Dept. of Mechanical Engineering and Aeronautics, Univ. of Patras, Patras, Greece

17:15-17:30 Dynamic Strain Behaviour of a Novel Chorded Mitral Prosthesis #6569
P.N. Wattona, Xiaoyu Luo, Min Yin; a Dept. of Mathematics, Univ. of Glasgow, Glasgow, UK; b Dept. of Engineering Mechanics, Xi’an Jiaotong Univ., PR China

14. Cardiovascular Mechanics

14.12.3 Tissue Adaptation and Remodelling
5th World Congress of Biomechanics

**Chairs:** Jay Humphrey and Ray Ogden
**Room G0.01**

16:00-16:15  **Stress-driven collagen fiber remodeling in arterial walls #4518**
I. Hariton, G. deBotton, T. C. Gasser, G. A. Holzapfel

* a The Pearlstone Center for Aeronautical Studies, Dept. of Mechanical Engineering, Ben-Gurion Univ., Beer-Sheva, Israel; b School of Engineering Sciences, Royal Institute of Technology, Stockholm, Sweden; c Computational Biomechanics, Graz Univ. of Technology, Graz, Austria

16:15-16:30  **A 3-D constrained mixture model for vascular growth and remodeling #5700**
Rudolph L. Gleason; Mechanical and Biomedical Engineering, Georgia Institute of Technology, Atlanta, GA, USA

16:30-16:45  **Remodeling of the collagen fiber architecture in cardiovascular tissues #4599**
Niels JB Driessen, Ralf A Boerboom, Carlijn VC Bouten, and Frank PT Baaijens

Dept. of Biomedical Engineering, Eindhoven Univ. of Technology, The Netherlands

16:45-16:00  **Stress-driven vascular remodelling #5443**
A. DiCarlo, P. Nardinocchi, L. Teresi, M. Tringelová

* a Università degli Studi “Roma Tre”, Roma, Italy; b Università di Roma “La Sapienza”, Roma, Italy; c Západočeská univerzita v Plzni, Plzeň, Czech Republic

17:00-17:15  **Modeling Mechanical Feedback During Early Cardiac Morphogenesis #4538**
Ashok Ramasubramanian and Larry A. Taber; Dept. of Biomedical Engineering, Washington Univ., St. Louis, MO USA

17:15-17:30  **An Anisotropic Constitutive Growth Model For Soft Tissues: An Application To Aneurysm #6950**
José F. Rodriguez and Manuel Doblaré Castellano; Structures and Material Modeling Group (GEMM). Aragon Institute of Engineering Research (I3A), Univ. of Zaragoza, Spain

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**19. Biotransport**

**19.8.2 Bioheat Transfer**

**Session Organizers /Chairs:** Hiroshi Ishiguro, Birgit Glasmacher

**Room R0.003**

16:00-16:15  **Microscopic study on the freezing behavior of liposomes #5550**
Masayuki Kobayashi, Kenji Nemoto, Gaku Tanaka, and Makoto Hishida

Department of Electronics and Mechanical Engineering, Chiba University, Chiba, Japan

16:15-16:30  **Influence of nucleation temperature on effective cooling rate and cell survival after cryopreservation #7115**
Ansgar Petersen, Guenter Rau, Birgit Glasmacher; Cryobiology & Biomaterials, RWTH Aachen Univ., Germany

16:30-16:45  **Numerical Simulation of Thawing Process of Biological Tissues as Porous Media during Cryosurgery #6197**
Sushil Kumar and V. K. Katiyar; Dept. of Mathematics, Indian Institute of Technology Roorkee, Roorkee, India

16:45-16:00  **Heat Transfer and Damage during Freezing of Food #7085**
Yukio Tada, Akira Takimoto and Yujiro Hayashi; "Graduate School of Natural Science and Technology, Kanazawa Univ., Kanazawa, Japan; "Kanazawa Univ., Kanazawa, Japan

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**Thread 1: Computational Methods in Biomechanics and Mechanobiology**

**T1.9.4 Computational Bone Mechanobiology: Remodelling, Healing, Growth and Osteointegration**

**Session Organizers:** Manuel Doblaré, Jan Herman Kuiper

**Room R1.007**

16:15-16:30  **Tissue differentiation and bone regeneration in an osteotomized and distracted mandible #4768**
Sanjay Mishra, Trevor Noel Gardner, Michael Schuetz; a School of Engineering Systems, Queensland Univ. of Technology, Brisbane, Australia; b School of Sports and Exercise Science, Univ. of Birmingham, Birmingham, UK; c Oxford Orthopaedic Engineering Centre, Univ. of Oxford, Oxford, UK
Daniel J Kelly¹, Antonio Boccaccio²,³; ¹Centre for Bioengineering, Dept. of Mechanical Engineering, Trinity College Dublin, Ireland; ²Dipartimento di Ingegneria Meccanica e Gestionale, Politecnico di Bari, Bari, Italy

16:30-16:45 A mechano-regulatory model relating distraction frequency to tissue differentiation pathway during distraction osteogenesis #4819
Hanna Isaksson a,b, Olivier Comas b, René van Donkelaar b, Rik Huiskes b, Keita Ito a,c
a AO Research Institute, Davos, Switzerland; b Dept. Biomed. Eng., Eindhoven Univ. of Tech., The Netherlands

16:45-16:00 A micro-Finite Element analysis of fluidic and solid mechanical stimuli in bone tissue engineering scaffolds #6812
Dannien Lacriotx, Clara Sandino, Miguel Villagomez, Maria-Pau Ginebra, Josep A. Planell Reference Centre for Bioengineering of Catalonia (CREBEC), Universitat Politècnica de Catalunya, Barcelona, Spain

17:00-17:15 Constitutive behaviour of a fibrin hydrogel in unconfined compression #5698
Hans Van Oosterwyck a,b, Wouter Wilson a, Jan Demol a, James Boak³, Tom Quinn³, Keita Ito a,c
a AO Research Institute, Davos, Switzerland; b Division of Biomechanics and Engineering Design, K.U.Leuven, Leuven, Belgium; c Dept. of Biomedical Engineering, Eindhoven Univ. of Technology, Eindhoven, The Netherlands; Cartilage Biomechanics Group, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

Thread 3: Biomechanics at Micro- and Nanoscale Levels
T3.5 Computational Biomechanics
Session Organizer /Chair: Takami Yamaguchi
Room R1.008

16:00-16:15 The Influence of the Endothelial Surface Layer on the Prediction of Wall Shear Stress in Small Arteries #6864
König CS and Long Q; Brunel Institute for Bioengineering, Brunel Univ., Uxbridge, Middlesex, UK

16:15-16:30 The effect of wall motion on arterial wall shear stress #5394
Tomohiro Fukui a, Kim H. Parker a, Ken-ichi Tsubota a, Shigeo Wada a, and Takami Yamaguchi a
a Dept. of Bioengineering and Robotics, Tohoku Univ., Graduate School of Engineering, Sendai, Miyagi, Japan; b Physiological Flow Studies Group, Dept. of Bioengineering, Imperial College, London, United Kingdom

16:30-16:45 MRI Measurements and CFD Analysis of Hemodynamics in the Aorta and the Left Ventricle #6800
Masanori Nakamura, Shigeo Wada, Suguru Yokosawa, Takami Yamaguchi Dept. of Bioengineering and Robotics, Tohoku Univ., Sendai, Japan

16:45-16:00 Hierarchical computational approach to predicting pilot ejection neck injury #6362
Peter VS Lee, KW Tan, HK Chan, CH Cheong Defence Medical and Environmental Research Institute, DSO National Labs, Singapore

17:00-17:15 Physical simulation for mobile nanorobot in the bloody laminar flows #4014
Aso Shojaie a, Mohsen Safaeinezhad b, a, b Dept. of Nanotechnology, Sozhin Intelligent Process CO.LTD, Sanandaj, Kurdistan, Iran

Thread 4: Imaging
T4.3 Imaging in Tissue Engineering
Session Organizer: Gadi Pelled
These presentations are in conjunction with Track 9 Tissue Engineering
Room R2.007

16:00-16:30 In Vivo Molecular Imaging in Stem Cell Based-Skeletal Tissue Engineering #7862
Gadi Pelled; Skeletal Biotech Laboratory, Hebrew Univ., Hadassah Medical Center, Jerusalem, Israel

16:30-16:45 Development of optical imaging for on-line monitoring in tissue engineering #7856
El Haj, AJ a, Wang R², Baganechini P a, Mafuili N a and Yang Y³ a, Institute of Science and Technology in Medicine, Keele Univ., UK; b School of Health, Univ. of Oregon, USA

16:45-16:00 Withdrawn

17:00-17:15 In vivo tracking of stem cells using magnetic tagging in a nude mouse model #7855
S. Wolbank a, H. Sura a, J. Dobson b, M. van Griensven a, H. Redl a and A.J. El Haj b

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Hierarchical bioimaging for structure function assessment in biomaterials and tissue engineering #7858
R Müller; Institute for Biomedical Engineering, Univ. and ETH Zurich, Zurich, Switzerland

Scientific Program
Friday, August 4, 2006

08:15-09:45
2 Musculoskeletal Mechanics-Joint ISB Track
2.6.1 Muscle Adaptation and Remodeling
Session Organizer: Jack Winters
Friday, August 4
Room R.1.049
08:15-08:30 Mechanical and biochemical stimuli as regulators of adaptation of muscle size and force #6088
Richard T. Jaspers, Can A. Yücesoy, Willem J. van der Laarse and Peter A. Huijing
Instituut voor Fundamenteele en Klinische Bewegingswetenschappen Vrije Universiteit Amsterdam, Integrated Biomedical Engineering for Restoration of Human Function, Universiteit Twente, Enschede, Dept. of Physiology, Vrije Universiteit Medical Center, Amsterdam, The Netherlands, Biomedical Engineering Institute, Bogazici Univ., Istanbul, Turkey
08:30-08:45 Self-organization and contractile function of 3-dimensional striated muscle engineered in culture #6725
Robert G. Dennis, Ellen M. Arruda, Ravi K. Birla, Keith Baar, Lisa M. Larkin, Paul E. Kosnik
Univ. of North Carolina at Chapel Hill, Biomedical Engineering, Chapel Hill, NC, USA; Univ. of Michigan, Mechanical Engineering, Cardiac Surgery, and Institute of Gerontology, Ann Arbor, MI, USA; Univ. of Dundee, Division of Molecular Physiology, Dundee, UK; Tissue Genesis, Inc. Honolulu, HI, USA
08:45-09:00 Integrating Hill-Based and Neuro-Fuzzy Adaptive Models to Estimate History-Dependent Muscle Mechanical Behavior #6157
Jack M. Winters, Yu Wang
Dept. of Biomedical Engineering, Marquette Univ., Milwaukee, WI, USA
09:00-09:15 Six Months Botulinum Toxin-Induced Quadriceps Muscle Weakness In The Rabbit #6021
Marco A. Vaz, David Longino, Tim Leonard, Cy Frank, Walter Herzog
School of Physical Education, Federal Univ. of Rio Grande do Sul, Porto Alegre, RS, Brazil; Faculty of Medicine, Univ. of Calgary, Calgary, AB, Canada; Faculty of Kinesiology, Univ. of Calgary, Calgary, AB, Canada
09:15-09:30 Effects of passive stiffness on spindle function in old rats #6424
Cédric Rosant, Marie-Danielle Nagel, Chantal Pérot
UMR-CNRS 6600 Biomécanique et Génie Biomédical, Université de Technologie de Compiègne, France

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.3.2 Neuromuscular Control-Joint ISEK Session
Session Organizers: Catherine Disselhorst-Klug, Hermi Hermens
Friday, August 4
Room R.1.046
08:15-08:30 Contribution of biarticular muscles to control of a squat jump #6629
Prokopow Przemyslaw
Computational Biomechanics Unit, RIKEN, Wako-shi, Saitama, Japan
08:30-08:45 Group Ia afferent pathway substantial for functional knee joint stability #4718
3.6.2 Gait Variability

Session Organizer /Chair: Mark Grabiner

Friday, August 4
Room R0.005

08:15-08:30  Kinematic and kinetic analysis of the ankle, tarsometatarsal and metatarsophalangeal joints during various modes of gait in normal adults #5012
Srinivas Uttarwar, Weijie Wang, Sheila Gibbs, Rami Abboud
Institute of Motion Analysis and Research, Univ. of Dundee, Dundee, United Kingdom

08:30-08:45  Gait kinematics in CP children participating in three year rehabilitation program #6690
T. Bober and A. Dziuba; Biomechanics Laboratory, Univ. School of Physical Education Wroclaw, Poland

08:45-09:00  The Plantar Pressure Characteristics of Subjects with knee Osteoarthritis #5419
Sai Wei Yang\(a\), Chi-Huei Hsieh\(b\), Lin-Fen Hsieh\(c\); \(a\) Institute of Biomedical Engineering, National Yang-Ming Univ., Taiwan; \(b\) Dept. of Rehabilitation, Shin Kong Wu Ho-Su Memorial Hospital, Taiwan

09:00-09:15  Gait Regularity in Elderly People: measurement, factors of variation and significance #6382
Auvinet B\(a\), Alix AS\(a\), Chaleil D\(b\), Barrey E\(b\); \(a\) Rheumatology, Laval Hospital, Laval, France; \(b\) Clinical Pharmacy, Faculty of Pharmacy, Angers, France; \(b\) LEPHR, Univ. of Evry, Evry, France

09:15-09:30  Variability of Ground Reaction Force on Stair in Patients after Surgical Hip Dislocation #5144
G. Luder, G. Deschner, M. R cocourt, L. Radlinger; Physiotherapy Research, Univ. Hospital Berne, Berne, Switzerland

09:30-09:45  Surface related muscle activation patterns in men and women #7229
Inga Wissemann, Wolfgang Potthast, Gert-Peter Brüggemann; Institute of Biomechanics and Orthopaedics, German Sport Univ. Cologne, Germany

09:45-10:00  Inter-subject and Intra-subject variability of modeled hip forces in subjects with total hip replacements #4907
Kharma C. Foucher, Markus A. Wimmer, Debra E. Hurwitz; Dept. of Orthopedic Surgery, Rush Univ. Medical Center, Chicago, IL, USA
4. Implants for Trauma and Orthopedics-Joint ESB Track

4.5 Shoulder Joint Arthroplasty
Chair: Erich Schneider, Roger Scholz

Friday, Aug. 4
Room E103

08:15-08:45 First in vivo measurements of contact forces in the shoulder joint #4280
G. Bergmanna, F. Griaichena, A. Bendera, M. Kääb, A. Rohlmannb, P. Westerhoffb
a Biomechanics Lab., biomechanik.de, Charité, CBF, Berlin, Germany; b Dept. of Orthopaedics, Charité, CCB, Berlin, Germany

08:45-09:00 The Mechanism of Failure in Cemented Glenoid Components – an in vitro study #4849
S. Gupta, U.N. Hansen, S. Sanghavi, R. Emery; Biomechanics Group, Dept. of Mechanical Engineering, Imperial College London, South Kensington Campus, London, United Kingdom.

09:00-09:15 Influence of architecture on the structural properties of the glenoid surface and underlying bone # 6007
Raghad Mim'ar, Richard M Hall, David L Limb; School of Mechanical Engineering, Univ. of Leeds, Leeds, UK; Academic Unit of Orthopaedic Surgery, St James's Univ. Hospital, Leeds, UK

5. Occupational and Impact Injury Biomechanics

5.8 Ballistic Injury Biomechanics

Session Organizers /Chairs: Cynthia Bir, Ian Horsfall
Friday, August 4
Room R0.058

08:15-08:30 Assessing Behind Armor Blunt Trauma with the Human Surrogate Torso Model #5823
Andrew Merkle, Jack Roberts; The Johns Hopkins Univ. Applied Physics Laboratory, Laurel, Maryland, USA

08:30-08:45 The biomechanics of stab resistant armour #6091
Horsfall, C. H. Watson, S. M. Champion; Cranfield Univ., Defence College of Management and Technology, Shrivenham, UK

08:45-09:00 Comparison of Male and Female Blunt Ballistic Impacts #6584
Marianne Wilhelm, and Cynthia Bir; Department of Biomedical Engineering, Wayne State University, Detroit, Michigan, USA

09:00-09:15 Wave and Deformation Effects in Behind Armour Blunt Trauma #7579
Duane Cronin; Univ. of Waterloo, Waterloo, Ontario, Canada

09:15-09:30 The Effect of Blast Load Conditions On Lung Injury #7551
Tyson Josey, Duane Cronin, C.P. Salisbury, K.V. Williams; Martec Limited, Medicine Hat, Alberta, Canada; Univ. of Waterloo, Waterloo, Ontario, Canada; Defence R&D Canada – Valcartier, Quebec, Canada

6. Sport Biomechanics-Joint ISB Track

6.6 Performance Pattern Variability

Session Organizers /Chairs: Wolfgang Schoellhorn, Natalai Balague
Friday, August 4
Room R D2.12

08:15-08:45 Performance pattern formation variability in biological movement systems: Implications for Biomechanists #7859
Keith Davids; School of Human Movement Studies, Queensland Univ. of Technology, Australia

08:45-09:00 Spectral analysis of rhythmic movement on improvisation in dancers #7088
Yu Hui Hung, Chung Yu Chen, Yu En Kuo; Graduate School of Physical Education, National Taiwan College of Physical Education, Taichung, Taiwan; Graduate Institute of Applied Sport Science, National Changhua Univ. of Education, Changhua, Taiwan

09:00-09:15 The Characteristics of Postural Tremors for the Elite Shooting Players under Different Standing Postures #4501
7. Dental Biomechanics
7.4 Numerical Modelling in Dental Biomechanics

Session Organizers: Arturo Natali, John Middleton
Friday, August 4
Room R1.006

08:15-08:30 Evaluation of biomechanical reliability of oral implant systems in consideration of bone-implant interaction phenomena #5135
A.N. Natali; Centre of Mechanics of Biological Materials, Univ. of Padova, Padova, Italy

08:30-08:45 Three dimensional finite element analysis of a dental tooth from exact structure # 6844
Rui Ping Hoo and Mark Hoffinan; The School of Materials Science and Engineering, The Univ. of New South Wales, Sydney, Australia

08:45-09:00 Viscoelastic behavior of the temporomandibular joint disc during masticatory dynamics #5643
J.H. Koolstra, T.M.G.J. van Eijden; Dept. of Functional Anatomy, Academic Centre for Dentistry Amsterdam, Univ. of Amsterdam and Free Univ., Amsterdam, Netherlands

09:00-09:15 FE-analyses of orthodontic movements of single and multi-rooted teeth #4795
Cattaneo, PM, Dalstra, M, and Melsen, B; Dept. of Orthodontics, Univ. of Aarhus, Aarhus, Denmark

09:15-09:30 Preoperative assessment of primary implant stability with finite element-enhanced planning: an in vitro study #6539
Thibaut Bardyna, Emeka Nkenkob, Wock Halle MANNb, Sigbjørn Olsenb; aMEM Center, Univ. of Bern, Bern, Switzerland; bDpt of Oral and Maxillofacial Surgery, Univ. Hospital of Erlangen, Erlangen, Germany

09:30-09:45 Searching for a functionally graded Hydroxyapatite-Ti dental implant with reliable mechanical behaviour through numerical models #6466
R. Controa, J.Vander Slotenb, P.Venaa, D. Gastaldia, T. Craeghsb, E. Verbekeb
aDept. of Structural Engineering, Politecnico di Milano, Italy; bDept. Of Mechanical Engineering, Catholic Univ. of Leuven, Belgium

8. Computer-Assisted Surgery
8.5 Clinical Evaluation

Session Organizers: Charles Taylor, Hans-Jakob Steiger
Friday, August 4
Room R1.003

08:15-08:30 A Registration-Free Intraoperative Procedure to Optimally Position the Ports and the Robots in MIRS #7679
Rainer Konieschke, Gerd Hirzinger; DLR, Institut für Robotik und Mechatronik, Oberpfaffenhofen, Germany

08:30-08:45 Mechanisms of scoliosis surgical correction related to Cotrel-Dubousset and In Situ Contouring Techniques #7209
Yoann Lafon-Jalby a, Jean Duboussset b, Jean-Paul Steib c, Wafa Skalli a
aLaboratoire de Biomécanique, CNRS UMR 8005, ENSAM, Paris, France; bHôpital Saint-Vincent de Paul, Paris, France; cHôpitaux Universitaires de Strasbourg, France.

08:45-09:00 Standardized CT/Fluoro matched navigation for the anterior stabilization of thoracolumbar spine fractures #7490
Oliver Gonschoreka, Sebastian Katscherb, Christoph Jostenb
aBG-Unfallklinik Murnau, Germany; bUniv. of Leipzig, Germany
09:00-09:15 Finite element simulation of ultrasound thermo-therapy of brain: Theoretical considerations for reducing the generated temperatures at the post target bone #7278
Sohrab Behnia a, Farzan Ghalichi b, Amin Jafari c, Ashkan Bonabi d
Dept. of Physics, IAU, Urmia, Iran; b Dept. of Biomedical Engineering, Sahand Univ., Tabriz, Iran; c Dept. of Physics, Urmia Univ., Urmia, Iran

09:15-09:30 Breast Volume Measurement Using 3D Surface Imaging #6211
Laszlo Kovacs a, Maximilian Eder b, Regina Hollweck b, Alexander Zimmermann c, Markus Settels d, Alexander Schneider e, Andreas Müller f, Matthias Endlich g, Nikolaos Papadopoulos h, Edgar Biemer i, Department of Plastic and Reconstructive Surgery, Institute of Medical Statistics and Epidemiology, Department of Surgery, Department of Radiology, Workgroup for Minimally Invasive Therapy and Intervention, Klinikum rechts der Isar, Technical Univ. Munich, Germany

09:30-09:45 Automatically image controlled mobile fluoroscope system #4356
Fei Liu, Richard Komistek, William Hamel, Mohamed Mahfouz, Preliasco Gabriel
Dept. of Mechanical, Aerospace, & Biomedical Engineering, the Univ. of Tennessee, Knoxville, USA

10. Cellular and Molecular Mechanics
10.7.2 Molecular Biomechanics: Biomechanics at Micro- And Nanoscale Levels
Session Organizers /Chairs: Masaaki Sato, X. Edward Guo
Friday, August 4
Room R0.056

08:15-08:30 Single-molecule analysis the cell-virus micromechanical interface #4623
Sean X. Sun a,b,c and Denis Wirtz d,e,f; aDept. of Mechanical Engineering, Johns Hopkins Univ., Baltimore, USA; bDept. of Chemical and Biomolecular Engineering, Johns Hopkins Univ., Baltimore, USA; cHoward Hughes Medical Institute graduate training program, Johns Hopkins Univ., Baltimore, USA

08:30-08:45 pH and ionic strength effect on single fibrinogen molecule interaction with mica surface studied with AFM #5582
Theodora Tsapikouni, Yannis Missirlis
Biomedical Engineering and Biomechanics Laboratory, Univ. of Patras, Greece

08:45-09:00 Nano Biomechanics Of The Human Intervertebral Disc Collagens #4469
Aladin K Darwesh a, Lu WW b, Cheung KMC a, Ngan AHW a, Chan D c, Luk KDK d
Dept. of Orthopaedics and Traumatology, Dept. of Mechanical Engineering, Dept. of Biochemistry, The Univ. of Hong Kong, Hong Kong

09:00-09:15 Engagement of single T cell receptor upregulates its ligand binding in subsecond time scale #5318
Veronika I. Zarnitsina a, Yan Zhang b, Ning Jiang c and Cheng Zhu a,b
aSchool of Mechanical Engineering and bDept. of Biomedical Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0363, USA

09:15-09:30 Analysis of gene expression in endothelial cells due to IL-1beta stimulation and neutrophil transmigration #5373
Noriyuki Kataoka a,b, Marcie R. Williams c, Suzanne G. Eskin b, Larry V. McIntire a
a Dept. of Medical Engineering, Kawasaki Medical School, Kurashiki, Okayama, Japan; b Dept. of Biomedical Engineering, Georgia Institute of Technology and Emory Univ. School of Medicine, Atlanta, GA, USA

09:30-09:45 Comparison of the orientation and strain patterns of stress fibers in cultured endothelial cells subjected to cyclic stretch #5658
Hiroshi Yamada, Hirokazu Ando; Dept. of Biological Functions and Engineering, Graduate School of Life Science and Systems Engineering, Kyushu Institute of Technology, Kitakyushu, Japan

11. Artificial Organs
11.4.2 Artificial Lungs and Oxygenators
Session Organizers: Ulrich Steinseifer, Mark Gartner
Friday, August 4
Room R1.002
Development of a highly integrated, extracorporeal membrane oxygenator (HEXMO) for safe and mobile treatment of patients with acute respiratory distress syndrome (ARDS) #6816
Andreas Strauß, Helmut Reul, Ulrich Steinseifer, Thomas Schmitz-Rode
Chair for Applied Medical Engineering, Helmholtz-Institute, RWTH Aachen Univ., Aachen, Germany

Computational Flow and Mass Transfer Analysis of a Pump-Oxygenator #5211
Brian Fill, Mark Gartner, Greg Johnson, Jiefu Ma, Marc Horner, Ension, Inc., Pittsburgh, Pennsylvania, USA

Progress toward a Multi-Objective Model for Artificial Lung Devices #7281
Juntao Zhang, Tao Zhang, Tim DC Nolan, Bartley P Griffith, Zhongjian J Wu
Artificial Organs Laboratory, Dept. of Surgery, Univ. of Maryland, Baltimore, Maryland, USA

Right heart responses to a thoracic artificial lung: a computational model #4627
Carrie E. Perlman, Lyle F. Mockros; Dept. of Physiology and Cellular Biophysics, Columbia Univ., New York, NY, USA; Dept. of Biomedical Engineering, Northwestern Univ., Evanston, IL, USA

Compliant Artificial Lungs #4616
Keith E. Cook; Univ. of Michigan Depts. of Surgery and Biomedical Engineering, Ann Arbor, Michigan, USA

Design of a Perfusion System for Fetal Cardiopulmonary Bypass #5214
Sarah Wright, Jeffrey Speakman, Joseph Tamblyn, Frank Pigula; Ension, Inc., Pittsburgh, Pennsylvania, USA; Boston Children’s Hospital, Harvard Univ., Boston, Massachusetts, USA

Transcatheter implantation of a valved stent in pulmonary position #5191
Philipp Bonhoeffer; UCL Institute of Child Health and Great Ormond Street Hospital for Children, London, UK

Stent fracture in percutaneous pulmonary valve implantation: a finite element study #4793
Silvia Schievano, Giovanni Parenzan, Francesco Migliavacca, Lorenzo Petrin, Gabriele Dubini, Philipp Bonhoeffer; UCL Institute of Child Health and Great Ormond Street Hospital for Children, London, UK

Finite element models of newly shaped prosthetic rings for the correction of Functional Mitral Regurgitation #5456
E. Votta, F. Maisano, O. Alfieri, F. M. Montevecchi, A. Redaelli; Dept. of Bioengineering, Politecnico of Milano, Milan, Italy; Heart Valve Division, IRCCS San Raffaele Hospital, Milano, Italy; Dept. of Mechanics, Politecnico of Torino, Torino, Italy

A fluid-structure interaction model of the aortic heart valve #4997
R. van Loon, S.J. Sherwin; Dept. of Aeronautics, Imperial College, London, UK

Visualization of transcatheter valve implantation in isolated human and porcine hearts #7190
Timothy G. Laske, Philipp Bonhoeffer, Paul A. Iaizzo; Medtronic Inc., Minneapolis, MN, USA; UCL Institute of Child Health and Great Ormond Street Hospital for Children, London, UK; Univ. of Minnesota, Minneapolis, MN, USA

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08:45-09:00 
withdrawn

09:00-09:15 Higher Order Bone Damage Effects and Variables #4896
D. T. Davy, W. Joo, F. Mazloomi; Case Western Reserve Univ., Cleveland, Ohio, USA

09:15-09:30 An elastic plastic damage constitutive model for cortical bone with distinct tension and compression damage variables #4984
M. Charlebois², D. García³, A. Curnier⁴, Ph. Zyssert⁴; ²Institute of Lightweight Design and Structural Biomechanics, Vienna Univ. of Technology (TU-Wien), Austria
³Laboratory of Applied Mechanics and Reliability (LMAF),

09:30-09:45 Universal microstructural patterns in bone: Micromechanics-based prediction of anisotropic material behavior #7089
Ch. Hellmich⁵, A. Fritschi⁶, L. Dormieux⁷; ⁵Institute for Mechanics of Materials and Structures, Vienna Univ. of Technology, Vienna, Austria; ⁷Laboratory of Materials and Structures, National School of Civil Engineering (ENPC), Marne-la-Vallée, France

Plenary Lecture
Friday, Aug. 4
10:00-10:30
G0.01
Endothelial Cell Response to Mechanical Stimuli: A View from Biomechanics #6380
Masaaki Sato, Tohoku University, Sendai, Japan

Friday, Aug. 4
11:00-12:50

1. Bone Mechanics – Joint ESB Track
1.6 Osteoporosis
Session Organizer /Chair: Bert van Rietbergen
Friday, August 4
Room R0.055

11:00-11:15 Estrogen deficiency has an indirect stimulatory effect on bone-formation, through coupling with resorption #7848
Ronald Ruimerman; Eindhoven Univ. of Technology, Eindhoven, The Netherlands

11:15-11:30 Mechanical and Histomorphometric Variations in Osteoporotic Trabecular Bone #6462
Orlaith Brennan¹,², Oran D Kennedy¹,², Nick J Mahony¹,², T Clive Lee¹,², Susan M Rackard³, and Fergal J O’Brien¹,²; ¹Royal College of Surgeons in Ireland, Dublin, Ireland; ²Trinity Centre for Bioengineering, Dublin, Ireland; ³Trinity College Dublin, Ireland; ⁴Univ. College Dublin, Ireland

11:30-11:45 Effects of early and late zoledronate treatment on bone microstructure in ovariectomized rats assessed by in vivo micro-CT #5710
Julienne Brouwers, Bert van Rietbergen, Rik Huiskes; Dept. of Biomedical Engineering, Eindhoven Univ. of Technology, Eindhoven, The Netherlands

11:45-12:00 Tissue level bone material property changes with sciatic nerve injury and bisphosphonate therapy #7527
Virginia Ferguson¹,², Cara Cannon¹,², Sara Campbell¹, Andrea Hanson², Ted Bateman³, Louis Stodieck³; ¹Dept. of Mechanical Engineering, Univ. of Colorado, Boulder, CO, USA; ²BisPhosSpace Technologies, Univ. of Colorado, Boulder, CO, USA; ³Dept. of Bioengineering, Clemson Univ., Clemson, SC, USA

12:00-12:15 Altered Mechanical Demand Of The Skeleton Broadly Changes Transcriptional Activity #7034
Stefan Judex, Melissa Monaghan, Clinton Rubin, Anil Dhundale
Biomedical Engineering, SUNY Stony Brook, NY, USA

12:15-12:30 Association between the strain rate of exercise-induced impacts and changes in bone density #6848
Riikka Heikkinen⁴, Erkki Vihriälä⁵,⁶, Aki Vainionpää⁷, Raija Korpelainen⁸,⁷ and Timo Jämsä³;
2 Musculoskeletal Mechanics-Joint ISB Track

2.6.2 Muscle Adaptation and Remodeling
Session Organizer: Jack Winters
Friday, August 4
Room R.1.049

11:00-11:15 Genetic Variations Define Muscle’s Susceptibility To Disuse And Subsequent Reambulation #7037
Stefan Judex, Christopher Gambino, Shiyun Xu, Ali Torhab-Parhiz, Liqin Xie, Clinton Rubin, Leah Rae Donahue, Engin Ozcivici; Biomedical Engineering, SUNY Stony Brook, NY, USA

11:15-11:30 Musculoskeletal adaptation to hindlimb suspension and voluntary cage wheel exercise #7574
Andrea Hanson, Steven Simske, Louis Stodieck, Cara Cannon, Virginia Ferguson; BioServe Space Technologies, Univ. of Colorado, Boulder, CO, USA

11:30-11:45 The effect of an 8 week lasting resistance training on movement independent muscle parameters #5610
Markus Tilp; Institute of Sports Science Graz, Austria

11:45-12:00 Muscle architecture in spastic Cerebral Palsy #6881
Mohagheghi AA, Khan T, Meadows T, Giannikas K, Baltzopoulos V, Maganaris CN
"Institute for Biophysical & Clinical Research into Human Movement, Manchester Metropolitan Univ., Stoke-on-Trent, UK; Booth Hall Children’s Hospital, Charlestown Road, Blackley, Manchester, UK

12:00-12:15 Predictive Model for Skeletal Muscle Adaptation #6140
Yu Wang, Jack M. Winters; Biomedical Engineering, Marquette Univ., Milwaukee, USA

2 Musculoskeletal Mechanics-Joint ISB Track

2.9.1 In Vivo Skeletal and Tendon Mechanics
Session Organizers /Chairs: V. Baltzopoulos, T. Fukunaga
Friday, August 4
Room R0.002

11:00-11:30 Instantaneous force –velocity relationships in human locomotion #7883
Paavo V. Komi and Masaki Ishikawa; Neuromuscular Research Center, Dept. of Biology of Physical Activity, Univ. of Jyväskylä, Finland

11:30-11:50 Tendon mechanical properties: influence of muscle actions #5951
Yasuo Kawakami

11:50-12:10 The likelihood of myofascial force transmission between synergistic and antagonistic muscles in vivo #5626
Peter A. Huijing, Institut voor Fundamentele en Klinische Bewegingswetenschappen, Faculteit Bewegingswetenschappen, Vrije Universiteit, Amsterdam, Netherlands

12:10-12:30 Does Force Enhancement Increase with Increasing Stretch Magnitudes? #6305
"Walter Herzog, "Brandon Hisey, and "Tim.Leaden; "Faculties of Kinesiology, Engineering and Medicine, Univ. of Calgary, Calgary, Canada; "Faculty of Kinesiology, Univ. of Calgary, Calgary, Canada

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track

3.3.3 Neuromuscular Control-Joint ISEK Session
Session Organizers: Catherine Disselhorst-Klug, Hermi Hermens
3. Musculoskeletal systems and Performance-Joint ISB/ESB Track

3.6.3 Gait Variability

Gait Variability: Session Organizer /Chair: Mark Grabiner

Friday, August 4
Room R0.005

11:00-11:15 3D motions of trunk and pelvis during transfemoral amputee gait #7224
Hélène Goujon a, Emilie Sapin a, Pascale Fodé b, François Lavaste c
a Laboratoire de Biomécanique, ENSAM-CNRS, Paris, France; b Centre d’Etudes et de Recherche sur l’Appareillage des Handicapés, Woippy, France

11:15-11:30 Functional Description of Ground-Reaction Forces #4990
Thomas Erteft a, Reinhard Blickhan a, H.-Jürgen Ertelt b, Science of Motion, Institute of Sports Sciences, Friedrich-Schiller-Univ. Jena, Germany; b ISD Luft- und Raumfahrtkonstruktionen Stuttgart, Germany

11:30-11:45 Insights on the Neural Control of Chaotic Gait Variability in the Elderly #6712
Max J. Kurz, Univ. of Houston, Houston, USA

11:45-12:00 Changes in movement patterns while walking due to sport activities at younger age #4603
Christian Haid a, Stefan Fischer a, Arnold Koller a; a Univ. Dept. of Orthopedics, Medical Univ. Innsbruck, Innsbruck, Austria; b Dept. of Sports Medicine, Medical Univ. Innsbruck, Innsbruck, Austria

12:00-12:15 Withdrawn

12:15-12:30 Recognising emotions in biomechanical gait patterns with neural nets #6390
Daniel Janssen; Karina Fölling; Wolfgang I. Schöllhorn; University of Münster, Germany
5. Occupational and Impact Injury Biomechanics

5.9.1. Computer Simulation
Session Organizers /Chairs: King H. Yang, Jess Snedeker
Friday, August 4
Room R0.058

11:00-11:15  Finite element analysis of traumatic brain injury in the rat hippocampus #6499
Liying Zhang, King Yang, Albert King; Bioengineering Center, Wayne State Univ., Detroit, USA

11:15-11:30  Human body modeling for occupant safety and comfort analysis #6169
Hyung Yun Choi, Sungjin Sah, Nicole Montmayeur, Eberhard Haug; Hongik Univ., ME Dept., Korea

11:30-11:45  The Need for a Detailed Model to Clarify Neck Injury Mechanism to Lateral Impact Loading Based on Human Volunteer Experiments #6204
Koshiro ONO, Susumu EJIMA, Koji KANEOKA, Makoto FUKUSHIMA; Japan Automobile Research Institute, Tsukuba, Japan

11:45-12:00  FE modelling of the neck responses in 3D loading and the influence of muscle activation for HSM evaluations #6229
Peter Halldin, Karin Brolin, Sofia Hedenstierna, and Nabih Alem; Royal Institute of Technology (KTH), School of Technology and Health, Huddinge, Sweden; U.S. Army Aeromedical Research Laboratory, Fort Rucker, AL, USA

6. Sport Biomechanics-Joint ISB Track

6.7. New Trends in Movement Analysis
Session Organizers: Mario Lamontagne, Tom Andriacchi
Friday, August 4
Room D2.12

11:00-11:45  A New Era in the Capture of Human Movement: Markerless Capture of Human Movement #7452
Thomas P Andriacchi, Lars Muendermann, Stefano Corazza, and Ajit Chaudhari; Stanford Univ., Stanford, CA, USA

11:45-12:00  Describing the Motion of the Lower Limbs using Inverse Kinematics #7242
N. Bogaert, T. De Wilde, C. Forausberger, J. Vander Sloten, G. Van der Perre, B. Haex, H. Bruyninckx; Division of Biomechanics and Engineering Design, Katholieke Universiteit Leuven, Heverlee, Belgium; Division of Production Engineering, Machine Design & Automation, Katholieke Universiteit Leuven, Heverlee, Belgium

12:00-12:15  Tibio-femoral motion: new insights from in vivo measurement #6116
Daniel L Benoit a, Dan K. Ramsey b, Mario Lamontagne c, Lanyi Xu c, Per Wretenberg d, Per Renström e; aDept. of Mechanical Engineering and bDept. of Physical Therapy, Univ. of Delaware, Newark DE, USA; c School of Human Kinetics, Univ. of Ottawa, Ottawa, Canada; d Section of Orthopaedics and e Section of Sports Medicine, Karolinska Univ. Hospital, Stockholm, Sweden

12:15-12:30  Neurornuscular Control of the Hamstrings to Protect the ACL: In Vivo Experimentation #6034
Mario Lamontagne a,c, A. Caraffa b,c, G. Cerulli b,c; a Univ. of Ottawa, Ottawa, Canada, b Univ. Hospital of Perugia, Perugia, Italy, c Biomechanics Laboratory, Let People Move, Perugia, Italy

12:30-12:45 Marker-less human motion tracking – opportunities for field testing in sports #6107
Uwe G. Kersting a, Paul R. McAlpine b, Bodo Rosenhahn b, Hans-Peter Seidel b, Reinhard Klette a
"Department of Sport and Exercise Science, The Univ. of Auckland, New Zealand; bMax Planck Center Saarbruecken, Germany; cComputer Science Department, The Univ. of Auckland, New Zealand"

7. Dental Biomechanics
7.5 Biomechanical Problems in the Dental Area
Session Organizers / Chairs: Jan Harm Koolstra, Martin Geiger
Friday, August 4
Room R1.006

11:00-11:15  Experimental and numerical investigation of the biomechanical behaviour of multi-rooted teeth with respect to headgear traction in a pig experiment #5054
Susanne Reimann a, Christoph Bourauel b, Martin Baxmann b, Ludger Keilig a, Alexander Vardimon b, Tamar Brosh b, a Dept. of Orthodontics, Univ. of Bonn, Bonn, Germany, b Dept. of Orthodontics, Tel Aviv Univ., Tel Aviv, Israel

11:15-11:30  The duration of the viscoelastic PDL response due to orthodontic tipping #4529
Noa Slomka a, Alexander D. Vardimon b, Amit Gefen a, Tamar Brosh b; a Dept. of Biomedical Engineering, Tel Aviv Univ., Israel; b Dept. of Orthodontics, "Dept. of Oral Biology, School of Dental Medicine, Tel Aviv Univ., Israel"

11:30-11:45  Complete characterization of oral occlusion loads acting in a human molar #4740
Estevam B. Las Casas a, André França de Almeida a, Tulimar P. M. Cornacchia a, Carlos Alberto Cimini Jr a, Paulo de Tarso Gomes a, Robson Rodrigues Lemos a and Jorge Milton Eliaan Saffar a
"School of Engineering, Federal Univ. of Minas Gerais, Belo Horizonte, Brazil; a School of Dentistry, Federal Univ. of Minas Gerais, Belo Horizonte, Brazil; "Center for Development of Nuclear Technology (CDTN), Belo Horizonte, Brazil, a School of Computers Science, Univ. of Caxias do Sul, Brazil."Technological Centre Foundation of the State of Minas Gerais (CETEC), Belo Horizonte, Brazil.

11:45-12:00  Custom suprastructures for immediately loaded, implant-supported dental prostheses #7436

12:00-12:15  Finite element analysis of a fibre reinforced anatomical post compound for endodontic treatments #6664
Franco Maceri a, Marco Martignoni b, Giuseppe Vairo a, a Dept. of Civil Engineering, Univ. of Rome “Tor Vergata”, Rome, Italy; b Martignoni Associates, Rome, Italy

12:15-12:30  Joint forces in a mandible with unilateral hypoplasia before and after mandibular distraction osteogenesis: a simulation study using a patient-specific musculo-skeletal model #5854
Mark de Zee a, Paolo M. Cattaneo a, Michel Dalstra a, John Rasmussen b, Peter Svensson b, Birte Melsen a, a Dept. of Orthodontics, Univ. of Aarhus, Denmark; b Institute of Mechanical Engineering, Aalborg Univ., Aalborg, Denmark; b Dept. of Clinical Oral Physiology, Univ. of Aarhus, Denmark

8. Computer-Assisted Surgery
8. 6 Training Simulators
Session Organizers: Rainer Burgkart, Gabor Szekely
Friday, August 4
Room R1.003

11:00-11:15 New haptic simulators for medical training #5571
Rainer Burgkart\textsuperscript{a}, Robert Rien\textsuperscript{e}, Tobias Obst\textsuperscript{a}; \textsuperscript{a} Clinic for Orthopaedics and Sports-Orthopaedics, Technical Univ. Munich, Germany; \textsuperscript{b} Institute of Automatic Control Engineering, ETH Zürich, Switzerland

11:15-11:30 Recent Advances in Virtual Reality Based Surgical Training Simulation #7838
Gabor Székely; ETH Zürich, Switzerland

11:30-11:45 New tangible interface devices for medical education #7777
Robert Rien\textsuperscript{e}, Bundit Panchaphongsaphak\textsuperscript{a}, Rainer Burgkart\textsuperscript{a}; \textsuperscript{a} Rehabilitation Engineering Group, ETH and Univ. Zurich, Switzerland; \textsuperscript{b} Clinic for Orthopaedics and Sport Orthopaedics, TU München, Germany

11:45-12:00 OR simulation in minimally invasive surgery #7821
D. Wilhelm, H. Feußner; Chirurgische Klinik und Poliklinik, Klinikum rechts der Isar der TUM, Munich, Germany

12:00-12:15 A meshfree computational methodology for surgical simulation #4067
Suvranu De and Yi-Je Lim; Dept. of Mechanical, Aerospace and Nuclear Engineering, Rensselaer Polytechnic Institute, Troy, USA

9. Tissue Engineering
9.6.1 Mechanobiology of Engineered Tissue
Session Organizer /Chair: Patrick Prendergast
Friday, August 4
Room R1.004

11:00-11:15 Computational modelling of microfluidodynamics in bioreactor-cultured cellular constructs
Margherita Cioffi, Fabio Galbusera, Manuela Teresa Raimondi, Federica Boschetti and Gabriele Dubini; Laboratory of Biological Structure Mechanics, Politecnico di Milano, Milano, Italy

11:15-11:30 Assessment methodology of mechanical functions of engineered cartilaginous tissue using quantitative MRI #4663
Shogo Miyata\textsuperscript{a}, Kazuhiro Homma\textsuperscript{a}, Tomokazu Numano\textsuperscript{b}, Katsuki Furukawa\textsuperscript{c}, Tetsuya Tateishi\textsuperscript{d}, Takashi Ushida\textsuperscript{e}; \textsuperscript{a} Graduate School of Life Science and Systems Engineering, Kyushu Institute of Technology, Fukuoka, Japan; \textsuperscript{b} National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan; \textsuperscript{c} Graduate School of Engineering, Univ. of Tokyo, Tokyo, Japan; \textsuperscript{d} National Institute for Material Science, Tsukuba, Japan; \textsuperscript{e} Graduate School of Medicine, Univ. of Tokyo, Tokyo, Japan

11:30-11:45 Mechanical indentation as a tool for functional characterisation of gene therapy constructs #6878
Kathryn Stok\textsuperscript{a}, Gina Lisignol\textsuperscript{b}, Sandra Cristino\textsuperscript{b}, Danièle Noël\textsuperscript{c}, Florence Apparailly\textsuperscript{c}, Christian Jorgensen\textsuperscript{d}, Andrea Facchini\textsuperscript{b} and Ralph Müller\textsuperscript{a}; \textsuperscript{a} Institute of Biomedical Engineering, Univ. and ETH Zürich, Zürich, Switzerland; \textsuperscript{b} Laboratory for Immunology and Genetics, Univ. of Bologna, Bologna, Italy; \textsuperscript{c} Inserm U475, Univ. Montpellier I, Montpellier, France; \textsuperscript{d} Unité Clinique d'Immunologie-du-Rhumatologie, CHU Lapeyronie, Montpellier, France

11:45-12:00 Mechanical characterization of tissue engineered corneal stroma #6614
Mark Ahearne\textsuperscript{a}, Ying Yang\textsuperscript{a}, Alicia El Haj\textsuperscript{a}, Hong Tham\textsuperscript{b}, Isaac Liu\textsuperscript{a}\textsuperscript{a} Institute of Science and Technology in Medicine, Keele Univ., Stoke-on-Trent, UK; \textsuperscript{b} Birmingham and Midland eye centre, Birmingham, UK

12:00-12:15 Tensile properties of a scaffold-free 3-D synthetic tissue cultured from synovium-derived cells #6893
Y. Fujishima\textsuperscript{a}, H. Fujie\textsuperscript{a}, K. Nagai\textsuperscript{a}, D. Katakai\textsuperscript{a}, W. Ando\textsuperscript{a}, H. Yoshikawa\textsuperscript{a}, N. Nakamura\textsuperscript{b}\textsuperscript{a} Biomechanics Lab, Kogakuin Univ., Tokyo, Japan; \textsuperscript{b} Dept. of Orthopaedic Surgery, Osaka Univ. Medical School, Osaka, Japan

12:15-12:30 Adhesion Behavior of Porcine Esophageal Fibroblasts on Extra-cellular Matrix Protein-Immolized Polyactic Acid Surface #6354
G. Ma\textsuperscript{a}, N. Cai\textsuperscript{a}, S. Tan\textsuperscript{b}, P. S. Mhaisalkar\textsuperscript{a}, K. S. Chian\textsuperscript{a}, V. Chan\textsuperscript{a}, K. Liao\textsuperscript{b}\textsuperscript{a} School of Electrical and Electronics Engineering, Nanyang Technological Univ., Singapore; \textsuperscript{b} School of Chemical and Biomedical Engineering, Nanyang Technological Univ., Singapore;
10. Cellular and Molecular Mechanics

10.7.3 Molecular Biomechanics: Biomechanics at Micro- And Nanoscale Levels

**Session Organizers /Chairs:** Masaaki Sato, X. Edward Guo

**Friday, August 4**

**Room R0.056**

11:00-11:15  
**On the role of anisotropy of membrane constituents in budding of a multicomponent membrane**

#6150

Iglič Aleša, Hägerstrand Henryb, Miha Fošnariča, Kralj-Iglič Veronika; Laboratory of Physics, Faculty of Electrical Engineering, Univ. of Ljubljana, Ljubljana, Slovenia, Dept. of Biology, Åbo Akademi Univ., Åbo/Turku, Finland, Institute of Biophysics, Faculty of Medicine, Univ. of Ljubljana, Ljubljana, Slovenia

11:15-11:30  
**Intracellular force balance in actin stress fiber network**

#5355

Shinji Deguchi a, b, Toshiro Ohashia, Masaaki Satoa; Dept. of Bioengineering and Robotics, Tohoku Univ., Sendai, Japan, Present: Graduate School of Natural Science and Technology, Okayama Univ., Okayama, Japan

11:30-11:45  
**Quantitative evaluation of strain field in the lamella region of cellular fragments from fish keratocytes**

#4547

Kennedy O. Okeyo, Yoshimichi Shitagawa, Taiji Adachi & Masaki Hojo; Dept. of Mechanical Engineering & Science, Kyoto Univ., Kyoto, Japan.

11:45-12:00  
**Mechanical properties of ankyrin repeats examined with single-molecule force spectroscopy**

#5459

Gwangrog Leea, Khadar Abdib, Yong Jianga, Peter Michaelyc, Vann Bennettb, and Piotr E. Marszałeck; Dept. of Mechanical Engineering and Materials Science and Center for Biologically Inspired Materials and Material Systems, Duke Univ., Durham, NC, USA, Howard Hughes Medical Institute and Dept. of Cell Biology, Duke Univ. Medical Center, Durham, NC, USA; Dept. of Cell Biology, Univ. of Texas Southwestern Medical Center, Dallas, Texas, USA

12:00-12:15  
**Molecular biomechanics of muscle contraction: a time-resolved x-ray diffraction study**

#5374

Sergey Y. Bershitsky a, Natalia Koubassova b, Michael A. Ferenczi c and Andrey K. Tsaturyan b, a Institute of Immunology and Physiology, Ural Branch of RAS, Yekaterinburg, Russia, b Dept. of Biomechanics, Institute of Mechanics, Moscow Univ., Russia, c Biomedical Sciences Division, Imperial College London, UK

12:15-12:30  
**Real-Time Microdamage Detection during Micromechanical Testing of Trabecular Bone**

#5538

P. J. Thurner, B. Erickson, R. Jungmann, S. Lam, J. C. Weaver, G. Schitter, G. E. Fantner, D. E. Morse, P. K. Hansma; Univ. of California, Santa Barbara, USA

11. Artificial Organs

11.5.1 Thrombosis in Devices and Cardiovascular Pathologies

**Session Organizers:** Danny Bluestein, Shmuel Einav

**Friday Aug. 4**

**Room R1.002**

11:00-11:30  
**New hypothesis for vulnerable plaque rupture: interfacial stress concentration induced debonding of calcified macrophages in the thin fibrous cap**

#6713

Yuliya Vengrenyukc, Savvas Xanthosb, Stéphane Carlierc, Luis Cardoso Landaa, Frank Kologdie, Lane Gilchristaf, Peter Ganatose, Renu Virmani, Shmuel Einav, Sheldon Weinbaum, Dept. of Biomedical Engineering, The City College of New York, CUNY, NY, USA, Dept. of Mechanical Engineering, The City College of New York, CUNY, NY, USA, Columbia Univ. Medical Center and Cardiovascular Research Foundation, New York, NY, USA, CVPath, International Registry of Pathology, Gaithersburg, MD, USA, Dept. of Chemical Engineering, The City College of New York, CUNY, NY, USA, Stony Brook Univ., Stony Brook, NY, USA, Tel Aviv Univ., Tel Aviv, Israel

11:30-11:45  
**Shear Dependant Platelet Accumulation in Hemodynamic Stenoses**

#5248

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Role of stent design in platelet thrombosis: A computational analysis #6980
Aditya S. Bedekar, Kapil Pant, and Shivshankar Sundaram
Biomedical Technology Branch, CFD Research Corporation, Huntsville, AL, USA

Comparison of ATS Open Pivot Valve and St Jude Regent Valve using a CFD-FSI model #6841
Kris Dumont, Danny Bluestein, Jan Vierendeels, Guido van Nooten, Pascal Verdonck
Cardiovascular Mechanics and Biofluid Dynamics Research Unit, IBiTech, Ghent Univ., Belgium; Dept. of Biomedical Engineering, Stony Brook Univ., Stony Brook, USA; Dept. of Flow, Heat and Combustion Mechanics, Ghent Univ., Belgium; Dept. of Surgery, Univ. Hospital Ghent, Belgium

A computational model combining vascular biology and haemodynamics for coil-induced thrombosis prediction in anatomically accurate cerebral vessels #4877
T Bowker, AS Bedekar, K Pant, S Sundaram, JV Byrne, P Summers, Y Ventikos
Fluidics and Biocomplexity Group & Institute of Biomedical Engineering, Dept. of Engineering Science, Univ. of Oxford, Oxford, UK; Biomedical Technology Branch, CFD Research Corporation, Huntsville, AL, USA; Dept. of Neuroradiology, Radcliffe infirmary, Univ. of Oxford, Oxford, UK.

14. Cardiovascular Mechanics
14.8.3. Thirty-five Years in Biofluid Mechanics-Dieter Liepsch’s Retirement Session
Session Organizer: Dieter Liepsch
Friday, August 4
Room G0.01

11:00-11:30 Keynote: Rheology and HydroThermodynamics of Oxygen Transport in Animals: 800 Millionen Years of functional improvement without genomic progress
Holger Schmid-Schönbein and Khosrow Mottaghy; Department of Physiology, RWTH Aachen; Aachen, FRG

11:30-12:00 Keynote: What Role Do Biofluid Mechanics Play in Health Care? # 7674
D. Liepsch; Institute of Biotechnique, Feldafing, Germany

12:00-12:15 Sinus of valsalva acts as a converging channel stabilizing coronary flow
Paul D. Stein, MD, Edward F. Blick, PhD, Afzal Beemath, MD, Brian J. Sabb, DO
St. Joseph Mercy Hospital, Pontiac, Michigan, USA

12:15-12:30 The Vascular Endothelial Cell: From Basic Research to a Vascular Implant
Robert M. Nerem; Georgia Tech/Emory Center for the Engineering of Living Tissues

14. Cardiovascular Mechanics
14.12.4 Tissue Adaptation and Remodelling
Chair: Gerhard Holzapfel, Shu Q. Liu
Friday, August 4
Room R1.008

11:00-11:15 Remodelling of the zero-stress state and residual strains in apoE-deficient mouse aorta #4404
Hans Gregersen, Jingbo Zhao, Xiao Lu, Ji Zhou, Erling Falk
Center of Excellence in Visceral Biomechanics and Pain, Aalborg Hospital; Aalborg, Denmark; Center of Sensory-Motor Interaction, Aalborg Univ., Aalborg, Denmark; La Jolla Bioengineering Institute, La Jolla, California, USA; Institute of Experimental Clinical Research and Dept. of Cardiology B, Skejby Hospital, Aarhus Univ., Aarhus, Denmark.

11:15-11:30 The effect of distension on the spacing between elastic lamellar units in the pig carotid artery #5124
Claire Hillery, Selin Hassan, Stephen Greenwald; Institute of Cell & Molecular Science, Barts & The London School of Medicine and Dentistry, UK

11:30-11:45 Mechanical Properties Of Elastase Treated Arteries #4981
11:45-12:00 Mechanical properties and structure of carotid arteries in hypervitaminosis D3 and nicotine treated rats #4050
David Jegger\textsuperscript{a,b}, Caroline Di Gilio\textsuperscript{a}, Rafaela da Silva\textsuperscript{a}, Gilles Prod'hom\textsuperscript{a}, Isabelle Lartaud\textsuperscript{d}, Virginie Gaillardin\textsuperscript{a}, Hendrik Tevaearai\textsuperscript{d}, Ludwig K. von Segesser\textsuperscript{b}, Jeffrey Atkinson\textsuperscript{d}, Nikolaos Stergiopulos\textsuperscript{a}; \textsuperscript{a} Laboratory of Haemodynamics and Cardiovascular Technology, EPFL, 1015 Lausanne, Switzerland; \textsuperscript{b} Dept. of Cardiovascular Surgery, CHUV, 1011 Lausanne, Switzerland; \textsuperscript{c} Dept. of Cardiovascular Surgery, Inselspital, 3000 Bern, Switzerland; \textsuperscript{d} Pharmacology Laboratory, Pharmacy Faculty, 54000 Nancy, France

12:00-12:15 Connective tissue composition and smooth muscle cell morphology of arterial wall in hypertensive rats #4307
Kozaburo Hayashi\textsuperscript{a} and Emiko Shimizu\textsuperscript{b}; \textsuperscript{a} Research Institute of Technology, Okayama Univ. of Science, Okayama, Osaka Univ., Toyonaka/Osaka, Japan; \textsuperscript{b} Feminine Care - Asia Engineering & Technical Systems, P&G, Kobe, Japan

12:15-12:30 Distension of human saphenous vein changes its biomechanical properties – implication for coronary artery bypass grafting #4403
Jingbo Zhao\textsuperscript{a}, Jan Jesper Andreasen\textsuperscript{b}, Jian Yang\textsuperscript{a}, Bodil Steen Rasmussen\textsuperscript{c}, Donghua Liao\textsuperscript{a}, Hans Gregersen\textsuperscript{a}; \textsuperscript{a}Center of Visceral Biomechanics and Pain; \textsuperscript{b}Dept. of Cardiothoracic Surgery; \textsuperscript{c}Dept. of Cardiothoracic and Vascular Anesthesia and Intensive Care; Aalborg Hospital; Aalborg, Denmark

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.10.2 Computational Biomechanics of Bone Damage and Failure
Session Organizers: Glen L. Niebur, Philippe K. Zysset
Friday, August 4
Room R1.007

11:00-11:15 Indirect determination of trabecular bone effective tissue properties using micro-finite element simulations #5777
Eelco Verhulp\textsuperscript{a}, Bert van Rietbergen\textsuperscript{a}, Ralph Müller\textsuperscript{b}, Rik Huiskes\textsuperscript{a}; \textsuperscript{a} Dept. of Biomedical Engineering, Eindhoven Univ. of Technology, Eindhoven, The Netherlands; \textsuperscript{b} Institute for Biomedical Engineering, Univ. and ETH Zuerich, Switzerland

11:15-11:30 Variations in Hard-Tissue Properties do not Significantly Affect Trabecular Strength #6171
Grant Bevill, Tony M. Keaveny; Dept. of Mechanical Engineering, Univ. of California at Berkeley, Berkeley, CA, USA

11:30-11:45 Damage and failure of trabecular bone with non-linear geometry and inhomogeneous material properties #7076
Noel Harrison, Denis O’ Mahoney, Pat Mc Donnell Peter Mc Hugh; National Centre for Biomedical Engineering Science and Dept. of Mechanical and Biomedical Engineering, National Univ. of Ireland, Galway, Ireland

11:45-12:00 Damage modeling of human vertebral trabecular bone specimens under experimental loading #6112
Todd L. Bredbenner\textsuperscript{a}, Daniel P. Nicolella\textsuperscript{a}, Dwight T. Davy\textsuperscript{b}; \textsuperscript{a}Materials Engineering Dept., Southwest Research Institute, San Antonio, TX, USA; \textsuperscript{b}Mechanical and Aerospace Engineering Dept., Case Western Reserve Univ., Cleveland, OH, USA

12:00-12:15 A relationship between damage accumulation and fabric in trabecular bone based on computational simulations #6184
Glen L. Niebur; Tissue Mechanics Laboratory, Univ. of Notre Dame, Indiana, USA

12:15-12:30 Acoustic energy: numerical analysis on damage accumulation and shock wave focussing in bone #7473
Andrea E. Tami\textsuperscript{a}, Ulf Knothe\textsuperscript{b}, Dwight T. Davy\textsuperscript{a}; \textsuperscript{a} Dept. of Mechanical & Aerospace Engineering, Case Western Reserve Univ., Cleveland, OH, USA; \textsuperscript{b} Orthopaedic Research Center, The Cleveland Clinic Foundation, Cleveland, OH, USA
Friday, Aug. 4
14:00-15:30

2 Musculoskeletal Mechanics-Joint ISB Track
Friday, August 4
Room R0.002
14:00-14:15 Plasticity of human tendon #7763
Fukunaga, Tetsuo and Kawakami, Yasuo; Waseda Univ., Faculty of Sport Sciences, Tokorozawa, Saitama, Japan
14:15-14:30 Human tendon response to loading #5544
S.P. Magnusson; Institute of Sports Medicine Copenhagen, Bispebjerg Hospital, Copenhagen, Denmark
14:30-14:45 Effect of cyclic strain magnitude on the adaptation of the mechanical properties of the Achilles tendon in vivo #6885
Adamantios Arampatzis, Kiros Karamanidis, Kirsten Albracht
Institute of Biomechanics and Orthopaedics, German Sport Univ. of Cologne, Germany
14:45-15:00 In vivo Human Tendon Adaptability to Mechanical Loading #6909
Constantinos N. Maganaris; Institute for Biophysical & Clinical Research into Human Movement, Manchester Metropolitan Univ. Cheshire, Stoke-on-Trent, UK

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.3.4 Neuromuscular Control-Joint ISEK Session
Session Organizers: Catherine Disselhorst-Klug, Hermi Hermens
Friday Aug. 4
Room R1.046
14:00-14:15 An EMG-Driven Model To Investigate Cocontraction Of Lower Extremity Muscles During Gait #7594
Tasos Karakostas a, Necip Bermeb, Simon Hsiangc; aMotion Analysis Laboratory, Medical Univ. of South Carolina, Charleston, USA; bMechanical Engineering, The Ohio State Univ., Columbus, USA; c Industrial Engineering, North Carolina State Univ., Raleigh, USA
14:15-14:30 Joint impedance attenuates neuro-muscular noise during target tracking #6876
Luc P.J. Selen, Peter J. Beek and Jaap H. Van Dieën; Institute for Fundamental and Clinical Human Movement Sciences, Vrije Universiteit, Amsterdam, The Netherlands
14:30-14:45 Measurement of ankle proprioception under self-driven servocontrol #6630
Kristell Dréau a, Derek Dazenb, RobRoy Martin b, Kali Arnold b, Stephen F. Conti b, Mark Carl Miller b,d, aEcole Normale Superieure de Cachan, France; b Allegheny General Hospital, Pittsburgh, PA, USA; c Duquesne Univ., Pittsburgh, PA, USA; d Univ. of Pittsburgh, Pittsburgh, PA, USA
14:45-15:00 Moved to 3.3.1
15:00-15:15 Robotized Jaw Movement Simulator JSN/2C Aimed at Simulating Autonomous Chewing Movement #5477
Toyohiko Hayahashi a, Yasuo Nakamura a, Shin-ichi Nakajima b, Hiroshi Kobayashi c, Yoshiaki Yamada d; aFaculty of Engineering, Niigata Univ., Niigata, Japan; b Dept. of Mechanical Engineering, Niigata Institute of Technology, Kashiwazaki, Japan; c Graduate School of Medical and Dental Sciences, Niigata Univ., Niigata, Japan

3. Musculoskeletal systems and Performance-Joint ISB/ESB Track
3.7 Energetics of Human Locomotion
Session Organizer: Art Kuo
Friday, August 4
Room R0.005

14:00-14:15  Constrained optimization of gait: integrating cost and control #6639
John E.A. Bertram\textsuperscript{a}, Anne Gutmann\textsuperscript{b}; \textsuperscript{a} Univ. of Calgary, Calgary, Canada; \textsuperscript{b} Cornell Univ., Ithaca, USA

14:15-14:30  Minimal model of a locomoting bipedal animal #7064
Manojoy Srinivasan\textsuperscript{a}, Andy Ruina\textsuperscript{b}; \textsuperscript{a} Mechanical and Aerospace Engineering, Princeton Univ., Princeton, USA; \textsuperscript{b} Theoretical and Applied Mechanics, Cornell Univ., Ithaca, USA

14:30-14:45  A particle collision model for calculating the energetic cost of the step-to-step transition in human walking #7563
Andy Ruina\textsuperscript{a}, Manojoy Srinivasan\textsuperscript{a,b}; \textsuperscript{a} Theoretical and Applied Mechanics, Cornell Univ., Ithaca, NY, USA; \textsuperscript{b} Mechanical and Aerospace Engineering, Princeton Univ., Princeton, NJ, USA

14:45-15:00  The Energetics of Controlling Balance during Human Walking #7580
Arthur D. Kuo\textsuperscript{a} and J. Maxwell Donelan\textsuperscript{b}; \textsuperscript{a} Dept. of Mechanical Engineering, Univ. of Michigan, USA; \textsuperscript{b} Dept. of Kinesiology, Simon Fraser Univ., Vancouver, CANADA

15:00-15:30  Future challenges for study of locomotion energetics
Panel Discussion

4. Implants for Trauma and Orthopedics-Joint ESB Track

4.6.2 Trauma Implants II

Chair: Lutz Claes, M. B. Sommers

Friday, Aug. 4

Room E1.03

14:00-14:15  Simulating the shear flexibility behavior of transverse tibia fractures treated with intramedullary nails #5291
Tim Wehner, Ulrich Simon, Lutz Claes; Institute of Orthopaedic Research and Biomechanics, Univ. of Ulm, Germany

14:15-14:30  Finite element study of external fixation system for fracture healing #5390
Wlodzimierz Choromanski, Grzegorz Dobrzynski, Agnieszka Lesniewska
Warsaw Univ. of Technology, Faculty of Transport, Warsaw, Poland

14:30-14:45  The loss of compression in intramedullary ankle Arthrodesis using two different types of compression rods – A biomechanical study #5753
\textsuperscript{a} Stefan Eichhorn, \textsuperscript{a} Tobias Lindner, \textsuperscript{b} Thomas Mückley, \textsuperscript{b} Oliver Trapp, \textsuperscript{b} Erwin Steinhauser
\textsuperscript{a} Clinic of Orthopedics and Traumatology, Dept. of Biomechanics, Univ. Hospital Rechts der Isar, Technical Univ. of Munich, Germany; \textsuperscript{b} Clinic of trauma hand and reconstructive surgery, Univ. of Jena, Germany; \textsuperscript{b} Traumacenter Murnau, Germany

14:45-15:00  Tibial nail distal interlocking: One screw inadequate, two satisfactory, but three usually unnecessary #7172
P. Upadhyay \textsuperscript{a} D. Walton\textsuperscript{b} M. Dunbar\textsuperscript{a} D. Griffin\textsuperscript{a}; \textsuperscript{a} Univ. of Warwick, Coventry, UK; \textsuperscript{b} The Univ. of Birmingham, Birmingham, UK

15:00-15:15  Fixation strength of single and double lag screw implants for intertrochanteric fracture fixation #7470
Mark B. Sommers \textsuperscript{a}, George K. Kouvidis \textsuperscript{b}, P.V. Giannoudis \textsuperscript{b}, Michael Stroppel \textsuperscript{a}, Michael Bottlang \textsuperscript{a}; Biomechanics Laboratory, Legacy Research & Technology Center, Portland, Oregon, USA; \textsuperscript{b} Trauma & Orthopaedic Surgery, St. James’s Univ. Hospital, Leeds, UK

15:15-15:30  Combined use of locked and non-locked screws for plating of fractures in osteoporotic bone #7583
Mark B. Sommers, Dan C. Fitzpatrick, Steven M. Madey, Michael Bottlang
Legacy Biomechanics Laboratory, Portland, OR, USA

5. Occupational and Impact Injury Biomechanics

5.9.2 Computer Simulation

Session Organizers /Chairs: King H. Yang, Jess Snedeker

Friday, August 4

Room R0.058

14:00-14:15  A Comprehensive, Modeling Based, Renal Injury Concept #6233
14:15-14:30 Concurrent quasistatic and dynamic validation of a biomechanical model of the lung for prediction of pulmonary contusion #7736
Joel Stitzel a,c, F. Scott Gayzik c, J. Jason Hoth b; a Dept. of Biomedical Engineering, Wake Forest Univ. School of Medicine; b Dept. of Surgical Sciences, Wake Forest Univ. School of Medicine; c Virginia Tech – Wake Forest Univ. Center for Injury Biomechanics, Winston-Salem, USA

14:30-14:45 New Approach For Modeling Of Human Hip And Shoulder Joints #6237
Masami Iwamoto, Isao Watanabe, Kazuo Miki; Toyota Central R&D Labs., Inc., Aichi, Japan

14:45-15:00 Using HUMOS2 Model for the Reconstruction of Accidents with Thoracical Injuries #7542
Katja von Merten; Institute for Legal Medicine, Ludwig-Maximilians-Universität, Munich, Germany

6. Sport Biomechanics - Joint ISB Track
6.8 Pressure Distribution in Sport
Session Organizers: Stefan Grau, Peter Brüggemann
Friday, August 4
Room D2.12

14:00-14:30 From functional footwear to better brassieres: Applying pressure distribution technology to enhance sports equipment #5428
Julie R Steele, Biomechanics Research Laboratory, Univ. of Wollongong, Wollongong, Australia

14:30-14:45 Intraarticular pressure distribution in the ankle joint #7793
Gert-Peter Brüggemann a, Wolfgang Potthast a, Jan Goldmann b, J. Koebke b; a Institute of Biomechanics und Orthopaedics, German Sport Univ. Cologne, Germany; b Dept. of Anatomy II, Univ. Cologne, Germany

14:45-15:00 The use of plantar pressure measurements in the detection of gait related risk factors for exercise-related lower-leg pain in sports active young adults #4129
Dirk De Clercq a, Tine Willems b, Anneleen De Cock a, Erik Witvrouw b; a Ghent Univ., Dept. of Movement and Sport Sciences, Belgium; b Ghent Univ., Dept. of Rehabilitation Sciences and Physiotherapy, Belgium

15:00-15:15 Plantar pressure distribution patterns after induced fatigue #4172
Günter Schlee, Thomas Milani, Anja Hein, Technische Universität Chemnitz, Institut für Sportwissenschaft, Chemnitz, Germany

15:15-15:30 Self-selected running speeds do not alter plantar pressure distribution data in barefoot running #4738
Maiwald C., Grau S., Krauss I., Mauch M., Hrsttmann T.; Univ. Hospital, Dept. of Sportsmedicine, Tuebingen, Germany

9. Tissue Engineering
9.6.2 Mechanobiology of Engineered Tissue
Session Organizer /Chair: Patrick Prendergast
Friday, August 4
Room R1.004

14:00-14:15 The influence of mechanical strain on adult rat marrow stromal cell dynamics #6225
E.M. Kearney a, E. Farrell a, P.J. Prendergast b, V.A. Campbell b; a Trinity Centre for Bioengineering, Trinity College, Dublin, Ireland; b Dept. of Physiology, Trinity College, Dublin, Ireland

14:15-14:30 Cell-mediated remodeling of engineered tissue equivalents is nonmonotonic with strain magnitude #6764
Jenna Balestrini, Kristen Billiar; Worcester Polytechnic Institute, Dept. of Biomedical Engineering, Worcester, MA, USA

14:30-14:45 Gene Expression of Fibroblasts Seeded on SIS and Subjected to Cyclic Mechanical Loading #4250
Thomas W. Gilbert, Ann M. Stewart-Akers, Jennifer Sydeski, Andrew R. Willment, Stephen F. Badylak; McGowan Institute for Regenerative Medicine, Univ. of Pittsburgh, Pittsburgh, PA, USA

14:45-15:00  Dielectrophoretic oriented patterning of cardiac myocytes - towards engineered cardiac tissue with controlled macroscopic anisotropy #6425
Mo Yang, Xin Zhang, Chee Chew Lim, Ronglih Liao; *Department of Health Technology and Informatics, Hong Kong Polytechnic University, Hong Kong, P.R.China; †Boston University, USA; ‡Brigham and Women’s Hospital, Harvard Medical School, Boston, USA

15:00-15:15  Muscle engineered from satellite cells of aged rats: contractile function, excitability, and structure #6751
Robert G. Dennis, Univ. of North Carolina at Chapel Hill, Biomedical Engineering, Chapel Hill, USA

15:15-15:30  Time course of in vitro development of engineered skeletal muscle: contractility and myosin heavy chain content #6727
Robert G. Dennis, Paul E. Kosnik; *Univ. of North Carolina at Chapel Hill, Biomedical Engineering, Chapel Hill, NC, USA; †Tissue Genesis, Inc. Honolulu, HI, USA

10. Cellular and Molecular Mechanics
10.8 Molecular Biomechanics
Session Organizers: Cheng Zhu, Wendy Thomas
Friday, August 4
Room R0.056

14:00-14:15  Catch bonds: a structural journey into shear enhanced bacterial adhesion #5063
Lina M. Nilsson, Wendy E. Thomas, Evgeni V. Sokurenko, Viola Vogel
*Laboratory for Biologically Oriented Materials, Dept. of Materials, Swiss Federal Institute of Technology (ETH), Zürich, Switzerland, and Depts. of Bioengineering and Microbiology, Univ. of Washington, Seattle, U.S.A

14:15-14:30  Biomechanics of Nanostructures at the Cellular and Molecular Levels #5280
Atsushi Ikai, Rehana Afrin, Hironori Uehara and Hiroshi Sekiguchi
Laboratory of Biodynamics, Graduate School of Bioscience and Biotechnology, Tokyo Institute of Technology, Yokohama, Japan

14:30-14:45  Analysis of ligand-receptor interactions at the single bond level with a laminar flow chamber #6617
Anne Pierres, Joana Vitte, Anne-Marie Benoliel and Pierre Bongrand
Lab. Adhesion and Inflammation; INSERM UMR600, CNRS UMR6212, Univ. Mediterranée, Marseille, France

14:45-15:00  Flow induced loop to β-strand conformational change in platelet glycoprotein Ib #5202
Jizhong Lou and Cheng Zhu
*Institute for Bioengineering and Bioscience and bDept. of Biomedical Engineering, Georgia Institute of Technology, Atlanta, GA, USA

15:00-15:15  Observing molecular interactions that stabilize, fold, activate and inhibit a single membrane protein# 6013
A. Kedrov & D.J. Müller; Center of Biotechnology, TU Dresden, Dresden, Germany

15:15-15:30  Quantifying the effect of molecular carrier on 2D kinetics of P-selectin-PSGL-1 interactions #6275
Li Wu, Botao Xiao, and Mian Long; National Microgravity Laboratory, Institute of Mechanics, Chinese Academy of Sciences, Beijing, P. R. China

11. Artificial Organs
11.5.2 Thrombosis in Devices and Cardiovascular Pathologies
Session Organizers: Danny Bluestein, Jimmy Moore
Friday Aug. 4
Room R1.002

14:00-14:30  Keynote: Platelet Activity Measurements and Numerical Simulations of Flow Induced Thrombus Formation in Cardiovascular Pathologies and Devices #7127
Danny Bluestein, Shmuel Einav, Mathew Titmus, Kris Dumont, Yared Alemu, Berhane Ghebrehiwet, Jolyon Jesty, Sebastian Okser, Yuefan Deng; aBiomedical Engineering, Stony Brook Univ., Stony Brook, NY, USA; bHematology, Stony Brook Univ. Hospital, Stony Brook, NY, USA; cApplied Math, Stony Brook Univ., Stony Brook, NY, USA
14:30-14:45 The effect of hemodynamic factors on thromboemboli formation #7496
Sagi Raz, Dikla Stern, Shmuel Einav; Dept. of Biomedical Engineering, Tel Aviv Univ., Israel

14:45-15:00 Platelet Deposition in Stented Artery Models and Their Correlation to Flow Dynamics #7189
James E Moore Jr., Richard T Schoephoerster, Nandini Duraiswamy
\(^a\)Dept. of Biomedical Engineering, Texas A&M Univ.; \(^b\)Dept. of Biomedical Engineering, Florida International Univ., USA

15:00-15:15 Real time assessment of the mechanisms regulating thrombus growth and dethrombosis #7262
Patrick Andre, Gillian Stephens, Connie Wong, David R. Phillips
Portola Pharmaceuticals Inc. South San Francisco, CA, USA

15:15-15:30 The influence of flow and platelet deposition on intravascular coagulation #4638
Aaron Fogelson, Nessy Tan; Univ. of Utah, Depts. of Mathematics and Bioengineering Salt Lake City, UT, United States

14. Cardiovascular Mechanics
Tissue Adaptation and Remodelling

14:00-14:15 Theoretical evaluation of the change in residual strain on the rabbit aorta with atherosclerotic plaques # 5473
Hiroshi Yamada, Kensuke Fujisaki, Kouji Okamoto; Dept. of Biological Functions and Engineering, Graduate School of Life Science and Systems Engineering, Kyushu Institute of Technology, Kitakyushu, Japan

14:15-14:30 Modeling of the pseudo-elastic properties of veins #4711
Georg Wolfgang Desch, Hans Werner Weizsäcker
\(^a\) Karl-Franzens-Universität, Graz, Austria; \(^b\) Medizinische Universität, Graz, Austria

14:30-14:45 Designing a tissue culture system to study the effects of pulsatile shear stress on aortic valve leaflet biology #6109
Philippe Sucosky, Muralidhar Padala, Kartik Balachandran, Kelsey Rosbach, Ashley Pognant, Stephanie Savelle, Hanjoong Jo, Ajit P. Yogathan; Wallace H. Coulter Dept. of Biomedical Engineering, Georgia Institute of Technology, Atlanta, GA, USA

14:45-15:00 Molecular basis for the formation of smooth muscle alpha actin filaments in CD34+ bone marrow cells #4531
Shu Q. Liu, Christopher Trefethen, Paul K. Alkema, Brandon J. Tefft, Andy Zhang, Li-Qun Zhang, and Yu H Wu; \(^a\) Biomedical Engineering Dept., Northwestern Univ., Evanston, IL, USA; \(^b\) Rehabilitation Institute of Chicago, Chicago, IL, USA

15:00-15:15 A 1-D phenomenological model for soft tissue damage and repair #5200
Alexander Rachev, Rudolph L. Gleason, Jr., and David Ku
\(^a\) Georgia Institute of Technology, The George W. Woodruff School of Mechanical Engineering, Atlanta, GA; \(^b\) Georgia Institute of Technology, The Wallace H. Coulter Dept. of Biomedical Engineering, Atlanta, GA

Thread 1: Computational Methods in Biomechanics and Mechanobiology
T1.12 Computational Biomechanics of the Musculoskeletal System
Session Organizers /Chair: Adamantios Arampatzis, Peter Brüggemann

14:00-14:15 Multi-body Based Computer Tools for Analysis of the Biomechanics of Musculoskeletal Systems #7382
Miguel Silva; IDMEC/IST, Instituto Superior Técnico, Technical Univ. of Lisbon, Portugal

14:30-14:45 Three-dimensional reconstruction of the human triceps surae muscle tendon unit in vivo #7111
Kirsten Albracht, Vasilios Baltzopoulos, Adamantios Arampatzis; Institute of Biomechanics and Orthopaedics, German Sport Univ. Cologne, Germany; Institute for Biophysical & Clinical Research into Human Movement, Manchester Metropolitan Univ., UK

14:45-15:00 Computation of tendon and joint forces during isokinetic concentric and eccentric knee extension #7530
Vasilios Baltzopoulos, Dimitrios E Tsaopoulos, Constantinos N Maganaris, Paula Richards
Institute for Biophysical & Clinical Research into Human Movement, Manchester Metropolitan Univ., Alsager, U.K.; North Staffordshire Univ. Hospital, Keele Univ., U.K.

15:00-15:15 Optimization of the Handbike’s Drive Concept by Means of a Simulation Model #5530
Böhm, H., Krämer, C., Senner, V.; Technische Universität München, Dept. Sport Equipment and Materials, München, Germany

Friday, August 4, 2006
Closing Ceremony
16:00
G0.01
### Poster Sessions

1. **7 Bone Mechanics – Poster Session**  
   Monday, July 31 - Tuesday, Aug. 1  
   Time: 16:00-17:30

2. **10 Musculoskeletal Mechanics – Poster Session**  
   Wednesday, Aug 2 - Thursday, Aug. 3  
   Time: 16:00-17:30

3. **8 Musculoskeletal systems and Performance–Poster Session**  
   Monday, July 31 - Tuesday, Aug. 1  
   Time: 16:00-17:30

4. **9 Implants for Trauma and Orthopedics–Poster Session**  
   Wednesday, Aug 2 - Thursday, Aug. 3  
   Time: 16:00-17:30

5. **15 Occupational and Impact Injury Biomechanics Poster Session**  
   Wednesday, Aug 2 - Thursday, Aug. 3  
   Time: 16:00-17:30

6. **13 Sport Biomechanics–Poster Session**  
   Monday, July 31 - Tuesday, Aug. 1  
   Time: 16:00-17:30

7. **6 Dental Biomechanics Poster Session**  
   Wednesday, Aug 2 - Thursday, Aug. 3  
   Time: 16:00-17:30

8. **7 Computer-Assisted Surgery Poster Session**  
   Wednesday, Aug 2 - Thursday, Aug. 3  
   Time: 16:00-17:30

9. **7 Tissue Engineering Poster Session**  
   Wednesday, Aug 2 - Thursday, Aug. 3  
   Time: 16:00-17:30

10. **9 Cellular and Molecular Mechanics Poster Session**  
    Monday, July 31 - Tuesday, Aug. 1  
    Time: 16:00-17:30

11. **6 Artificial Organs Poster Session**  
    Wednesday, Aug 2 - Thursday, Aug. 3  
    Time: 16:00-17:30

12. **12.4 Biomaterials Poster Session**  
    Wednesday, Aug 2 - Thursday, Aug. 3  
    Time: 16:00-17:30

13. **7 Invited Respiratory Mechanics Poster Session**  
    Wednesday, Aug 2 - Thursday, Aug. 3  
    Time: 16:00-17:30

14. **16 Cardiovascular Mechanics Poster Session**  
    Monday, July 31 - Tuesday, Aug. 1  
    Time: 16:00-17:30

15. **7 Microcirculation Poster Session**  
    Monday, July 31 - Tuesday, Aug. 1  
    Time: 16:00-17:30

16. **9 Reproductive Biomechanics Poster Session**  
    Monday, July 31 - Tuesday, Aug. 1  
    Time: 16:00-17:30

17. **6 Biomechanics in Nature Poster Session**  
    Monday, July 31 - Tuesday, Aug. 1  
    Time: 16:00-17:30

18. **7 Trends in Cranial and Spinal Biomechanics Poster Session**  
    Monday, July 31 - Tuesday, Aug. 1  
    Time: 16:00-17:30

19. **9 Biotransport Poster Session**  
    Wednesday, Aug 2 - Thursday, Aug. 3  
    Time: 16:00-17:30

20. **7 Biomechanics of Organs Poster Session**  
    Monday, July 31 - Tuesday, Aug. 1  
    Time: 16:00-17:30

Thread 1: **Computational Methods in Biomechanics and Mechanobiology Poster Session**  
   Wednesday, Aug 2 - Thursday, Aug. 3  
   Time: 16:00-17:30
Thread 2 Flow-Structure Interations Poster Session  
Monday, July 31-Tuesday, Aug. 1  
16:00-17:30

Thread 4: Imaging Poster Session  
Wednesday, Aug 2 - Thursday, Aug. 3  
16:00-17:30

T5 Electro-Impedance Poster Session  
Wednesday, Aug 2 - Thursday, Aug. 3  
16:00-17:30
The following thread sessions have been incorporated into their corresponding tracks. Please see the track program for more information.

**Thread 1: Computational Methods in Biomechanics and Mechanobiology**
*T1.6 Computational Biomechanics and Mechanobiology of the Brain*
*The papers will be presented as a part of Track 18 Neural and Spinal Mechanics*

**Thread 2: Flow-Structure Interactions**
*T2.3 Neural Mechanics FSI*
*These presentations will take place as a part of session 18.2 'Imaging and management of CSF dynamics’ in Track 18 ‘Trends in Cranial and Spinal Biomechanics’ organized by Hans-Jakob Steiger and Hiroshi Ujiie*

*T2.4 FSI in swimming*
*These presentations will take place as a part of session 17.4.2 ‘Swimming’ in Track 17 ‘Biomechanics in Nature’ organized by Tim Pedley and Johan van Leeuwen*

*T2.5 FSI in flying*
*These presentations will take place as a part of session 17.4.3 ‘Flying’ in track 17 ‘Biomechanics in Nature’ organized by Tim Pedley and Johan van Leeuwen*

**Thread 3: Biomechanics at Micro- and Nanoscale Levels**
*T3.2 Molecular Biomechanics*
*(These presentations will take place as a part of Cellular Molecular Mechanics Track 10)*
*Session Organizer: Masaaki Sato*

*T3.3 Mechanobiology of Micro- and Nano-Scale Levels*
*(These presentations will take place as a part of Tissue Engineering Track 9)*
*Session Organizer: Takashi Ushida*

*T3.4 Molecular Biomechanics*
*(These presentations will take place as a part of Cellular Molecular Mechanics Track 10)*
*Session Organizer: Masaaki Sato*

**Thread 4: Imaging**
*Thread organizers: Ralph Müller, Peter Augat*
*T4.1.2 Advanced Detection of Bone Quality*
*Session Organizer: Peter Niederer*
*These papers will be presented within Track 1 Bone Mechanics*

*T4.1.3 Advanced Detection of Bone Quality*
*Session Organizer: Peter Niederer*
*These papers will be presented within Track 1 Bone Mechanics*

*T4.1.3: Ultrasound for the Detection of Bone Quality*
*These papers will be presented within Track 1 Bone Mechanics*

*T4.6 Trends in cranial and spinal biomechanics - Imaging*
*Session Organizer: Karl-Josef Langen*
These presentations will take place as a part of Placed in Track 18.3 Trends in cranial and Spinal Biomechanics