AO Foundation Research

THE FIRST 50 YEARS

European CELLS & MATERIALS

ECM IX

MUSCULOSKELETAL TRAUMA: 50 YEARS OF AO RESEARCH

June 15-18, 2008 | Convention Centre,
Davos, Switzerland

ECM WELCOMES YOU TO DAVOS

Dear colleagues

This international forum continues the ECM congress series held in Davos. The limited number of participants (150) brings together clinicians, biologists, engineers and material scientists to share knowledge in basic, translational and clinical research and developments in the large field of Musculoskeletal Trauma. The single session permits in depth multi-disciplinary set of discussions where everyone is welcome to discuss to move this research forwards.
Yours sincerely,

Prof R. Geoff Richards
Course Chairman

Prof Charlie W. Archer
Course Chairman

Prof Mauro Alini
Course Chairman

Conference Organisers

R. Geoff Richards- Editor-in-Chief ECM Journal.
Head of Bio Performance of Materials & Devices Program, ARI, AO Foundation, Davos, CH

Mauro Alini - Sceintific Editor ECM Journal.
Head of Tissue Engineering & Biomaterials Program, ARI, AO Foundation, Davos, CH

Charlie W. Archer - Sceintific Editor ECM Journal
Connective Tissue Biology Research Group, Cardiff Institute of Tissue Engineering & Repair, Cardiff University,Wales, GB

50 Years of AO Research

The AO Group, a Swiss Group of thirteen general and orthopedic surgeons started 50 years ago. This small society developed into an internationally active Foundation that has made essential contributions to fracture treatment based on experimental and clinical research. Fundamental changes were the direct results of some of this research. Improvements in patient treatment were realized. Generally accepted schools of thought were challenged. This opened up the way for new and creative approaches. This years meeting celebrates some of the areas AO Research works within.

Unfortunately, Professor Berton Rahn, one of the cornerstones of the Research from AO for 35 years until his retirement in 2003 recently passed away and another cornerstone of the Research Professor Stephan Perren will start the meeting with a tribute to Berton.

There will be a special session on imaging dedicated to Dr. Iolo ap Gwynn, The University of Wales, Aberystwyth who has worked in the field of biological electron microscopy for over 40 years. Iolo ran the only full-time postgraduate course in biological electron microscopy in Europe, for over ten years in the 80's/90's through which he has inspired many scientists (including myself). Iolo has studied (1962-1969) and then taught in Aberystwyth (1969 and ongoing) for 45 years and I can say from personal experience he is one of the best lecturers in the microscopy field. He always keeps the attention of the audience, even with tough subjects such as electron optics. I have known Iolo, originally as my University tutor in 1987, for 20 years and had the honour to teach electron microscopy courses with him for the last 10 years. Iolo also has been connected for a long time with Swiss mountains having climbed the Matterhorn (4478M) and the Dom (4545, the highest mountain totally within Switzerland, first summited by a Welshman Rev J. Llewelyn Davies in 1858). The imaging session will include several areas of optical microscopy.

R.Geoff Richards, AO Research Institute

Scientific Programme
Sunday, June 15th

Welcome

09:30 – 09:35 **Prof. R. Geoff Richards, AO Research Institute, Davos**
Opening

09:35 – 09:50 **Prof. Stephan Perren, AO Foundation, Davos**
Tribute to Prof. Berton Rahn (1939-2008)

09:50 – 10:10 **Prof. Stephan Perren, AO Foundation, Davos** (Ex Director and Co-founder of AO Research Institute and AO Development)
Fundamental consideration of Research: With reference to the AO Research Institute and the AO Foundation

AO R&D in the First 50 years I
Session 1 Chair: Dr. Karsten Schwieger

10:30 – 11:00 **Dr. Slobodan Tepic (Scyon Orthopaedics, CH) (Ex- AO Research Institute)**
Locking screw implants in internal fixation

11:00 – 11:30 **Dr. Stephen Bresina (Scyon Orthopaedics, CH) (Ex- AO Research Institute)**
Locking screw fixation for total hip prosthesis

11:30 – 12:00 **Dr. Nick Bishop (Hamburg, D) (Ex- AO Research Institute)**
Tissue sparing hip implants

12:00 – 12:30 **Robert Frigg (Synthes AG, CH) (Ex- AO Development Institute)**
Locking compression plates (LCP) & the less invasive stabilization system (LISS)

AO R&D in the First 50 years II
Session 2 Chair: Prof. Keita Ito

14:00 – 14:30 **Dr. Stephen Ferguson, MEM Centre Bern, CH (Ex- AO Research Institute)**
Femeroacetabular impingement

14:30 – 15:00 **Prof. Keita Ito, Eindhoven University of Technology, NL (Ex- AO Research Institute)**
Understanding bone healing: combining *in silico* and *in vivo* approaches

15:00 – 15:30 **Ronald Wieling, Icotec (Ex- AO Research Institute)**
Carbon fibre reinforced PEEK medical implants

AO R&D in the next 50 years
Session 3 Chair: Dr. Martin Stoddart

16:00 – 16:30 **Prof. R. Geoff Richards, AO Research Institute, Davos**
The role of implant surfaces in fracture fixation

16:30 – 17:00 **Dr. David Eglin, AO Research Institute, Davos**
Biodegradable materials for osteosynthesis & tissue engineering

17:00 – 17:30 **Prof. Mauro Alini, AO Research Institute, Davos**
Stem cells for musculoskeletal regeneration

Monday, June 16th

Bone I
Session 4 Chair: Prof. Charlie Archer

08:10 – 08:40 **Dr. Nikolaus Renner, Kantonsspital Aarau, CH**
Current problems in fracture treatment: what the surgeon wants

08:40 – 09:10 **Dr. Jürg Gasser, Novartis, Basel, CH**
Osteoporosis: Who's guilty?

09:10 – 09:40 **Prof. Joost D. de Bruijn, Queen Mary University of London, UK**
Preparation of a Resorbable Osteoinductive Tricalcium Phosphate Ceramic

09:40 – 09:55 Standardized augmentation of osteoporotic bone for improved implant performance
A Gisep, V Boner, N Suhm, Th Kaup

09:55 – 10:10 A novel sheep model for evaluating biomaterials in cancellous bone
LP Bouré, S Zeiter, U Seidenglanz, M Leitner, B van der Pol, R Matthys, SG Pearce

10:10 – 10:25 Influence of the mechanical environment upon the healing of segmental bone defects in a rat model studied with a novel external fixator
V Glatt, R. Matthys, A Ivkovic, C Evans

Bone II
Session 5 Chair: Dr. Jürg Gasser

11:00 – 11:30 **Prof. Ranieri Cancedda, University of Genova, IT**
Cell therapy of bone

11:30 – 12:00 **Prof. Chris Evans, Harvard Medical School, Boston USA**
Characterization and utilization of mesenchymal progenitor cells recovered with the Reamer-Irrigator-Aspirator

12:00 – 12:15 The many roles of the extracellular calcium-sensing receptor, CaR, in osteoblast biology
D Riccardi, MM Dvorak, C De Joussineau, SL Dallas, DT Ward, DH Carter, PJ Kemp

12:15 – 12:30 Improving the osteogenic behaviour of human mesenchymal stromal cells
A Ivkovic, RM Porter, JW Wells, CH Evans

12:30 – 12:45 Control of osteoblast genotype with implant surface micortopography
JS Hayes, C Archer, RG Richards

Spine
Session 6 Chair: Prof. Mauro Alini

17:00 – 17:30 **Dr. Daisuke Sakai, Tokai University, Isehara, Kanagawa, JP**
New insights into regeneration of intervertebral disc and spinal cord

17:30 – 18:00 **Dr. Cynthia Lee, Johnson & Johnson Regenerative Therapeutics, Raynham, MA, USA**
Intradiscal growth factor therapies for intervertebral disc degeneration

18:00 – 18:15 Morphological changes of intervertebral disc cells in the porcine and human injured cervical spine following trauma
I Sitte, A Kathrein, K Pfaller, F Pedross, S Roberts

18:15 – 18:30 Effect of limited nutrition on intervertebral disc cells under "Physiological" loading – A 21 day culture
S Juenger, B Gantenbein, M Alini, SJ Ferguson, K Ito

18:30 – 18:45 Pedicular screw fixation on osteoporotic vertebrae: intraoperative evaluation of local bone strength and bone augmentation via perforated pedicular screws
LM Benneker, M Haenni, PF Heini

18:45 – 19:00 Survival of bone marrow stromal cells within hydrogels: A comparison to nucleus pulposus cells and articular chondrocytes
S Zeiter, M van der Werf, K Ito

Tuesday, June 17th

Infection
Session 7 Chairs: Prof. Dave Grainger & Prof. R. Geoff Richards

08:10 – 08:40 **Dr. Dominik Heim, Spital Frutigen, CH**
Clinical infections with fracture fixation – The Frutigen experience

08:40 – 09:10 **Prof. Sheila Patrick, Queens University, Belfast, UK**
Improved detection and treatment of prosthetic joint infection

09:10 – 09:40 **Dr. Fintan Moriarty, AO Research Institute, Davos, CH**
Can we influence the risk of infection by implant design changes?

09:40 – 10:10 **Prof. David Grainger, University of Utah, Salt Lake City, USA**
Anti-microbial device-based approaches to implant-centered infection

10:10 – 10:25 Continuous real-time evaluation of microorganism growth kinetics & interactions with antimicrobial materials by isothermal micro-nano calorimetry (IMNC)
AU Daniels, U von Ah, D Wirz

Imaging: Dedicated to Dr. Iolo ap Gwynn
Session 8 Chair: PD Dr. Stefan Milz

10:55 – 11:25 **Prof. Graham Dunn, Kings College, London, GB**
Role of the cytoskeleton in cell locomotion

11:25 – 11:55 **Dr. Jim Ralphs, Cardiff University, Wales, GB**
Confocal laser scanning microscopy in connective tissue research

11:55 – 12:25 **Dr. Gethin Owen UBC, Vancouver, CA**
Cryo-electron tomography: 3D imaging at nm resolution

12:25 – 12:40 **Andrea Tami, AO Research Institute, Davos, CH**
In vivo and *in vitro* tomographic imaging of bone, implants and bioresorbables

12:40 – 13:05 **Dr. Iolo ap Gwynn, Aberystwyth University, Wales, GB**
Biological scanning electron microscopy

13:05– 13:25 **Prof. R. Geoff Richards, AO Research Institute, Davos**
Dedication to Iolo ap Gwynn

Wednesday, June 18th

Cartilage I
Session 9 Chair: Prof. Bruce Caterson

08:30 – 09:00 **Prof. Charlie Archer, Cardiff University, Wales, GB**
Inhibition of chondrocyte death at the wound edge enhances integrative cartilage repair

09:00 – 09:30 **Prof. Brian Johnstone, Oregon Health and Science University, Portland, USA**
Cell sources for cartilage tissue engineering

09:30 – 09:45 Synovial fluid stem cells: A potential cell source for cartilage tissue engineering
A Crawford, EA Jones, A English, J Mundy, D McGonagle

09:45 – 10:00 Articular chondroprogenitors as tools for cartilage tissue engineering
IM Khan, JC Bishop, R Williams, CW Archer

10:00 – 10:30 **Prof. Ivan Martin, Basel University, Basel, CH**
Do we really need cartilage tissue engineering?

Cartilage II
Session 10 Chair: Prof. Brian Johnstone

11:00 – 11:30	**Prof. James Richardson, Robert Jones / Agnes Hunt Orthopaedic Hospital, Oswestry, GB** Success/Failure in orthopaedic cell engineering
11:30 – 11:45	Integration strength of engineered cartilage to native cartilage and bone and synthetic substrate MA Randolph, LJ Bonassar, TS Johnson, NA O'Sullivan, MJ Yaremchuk
11:45 – 12:00	The effect of sliding velocity on chondrocytes activity in 3D scaffolds S Grad, MA Wimmer, M. Alini
12:00 – 12:30	**Prof. Bruce Caterson, Cardiff University, Wales, GB** Chondroitin sulphate motifs as biomarkers for the stem/progenitor cell niche in musculoskeletal tissues
12:30 – 12:45	Connexin43 expression in cartilage progenitor cells and its possible role in cell differentiation P Marcus, D Bazou, C Archer
12:45 – 13:00	Pro-inflammatroy cytokines inhibit chondrogenesis by human mesenchymal stem cells through NF-KB-dependent pathways RM Porter, N Wehling, GD Palmer, JW Wells, PE Müller, CH Evans

13:00 – 13:15 Best student oral and poster prizes

13:15 – 13:30 Conference summary (Prof. M. Alini & Prof. RG Richards)

13:30 End of meeting

Posters

1. Porous PVA-Chitosan based hydrogel as an extracellular matrix scaffold for cartilage regeneration
   AA Abbas, SY Lee, L Selvaratnam, N Yusof, T Kamarul
2. Guiding migration and differentiation of rat bone marrow stromal cells using d.c. electric fields *in vitro* – Implications in bone tissue engineering
   B Annaz, B Reid, B Olalde, MJ Jurado, JI Alava, CD McCaig, IR Gibson
3. Hydroxyapatite particles maintain peri-implant bone mantel in osteoporotic bone
   M Baucke, A Tami, M Pucher, P Montavon, K Ito
4. In vitro evaluation of a new system to reduce periimplant strains in horses
   S Brianza, V Brighenti, K Schwieger, LP Boure
5. Corrosion and tissue reaction to three guide wires (MP35N, L605 & 316L) in combination with a conventional 316L stainless steel cannulated screw
   DM Devine, M Leitner, SM Perren, LP Boure, SG Pearce
6. An in vivo implantation study in New Zealand white rabbits for granular hydroxyapatite
   A Hafiz, KA Khalid, A Yusof, MA Azril, A Shukrimi, MY Nazri, CA Aminudin, Z Zamzuri, F Fazan
7. Granules Hydroxyapatite application in fractures
   A Hafiz, KA Khalid, MA Azril, A Shukrimi, MY Nazrä, CA Aminudin, Z Zamzuri, F Fazan
8. Surface polishing positively influences ease of fracture fixation plate and screw removal, and the surgical time required for extraction
   JS Hayes, C Archer, RG Richards
9. Surface polishing eases intramedullary nail removal – A novel in vivo study
   JS Hayes, DI Vos, J Hahn, SG Pearce, RG Richards
10. Photo-crosslinking collagen gel for tissue engineered cartilage
    S Ibusuki, MA Randolph, A Papadopoulos, RW Redmond, IE Kochevar, TJ Gill
11. Monitoring of cell migration
    JP Kaiser, A Bruinink
12. The effects of oral glucosamine sulphate and chondroitin sulphate on focal (traumatic) cartilage damage
    T Kamarul, T Masjuddin, A Ab Rahim, A Razif, L Selvaratnam
13. Tenocyte alignment is dependant upon cell density and tensional loading
    T Kamarul, MM Roebuck, RL Williams, SP Frostick
14. Open-porous ceramics for bio-applications
    F Krauss, UT Gonzenbach, AR Studart, LJ Gauckler, L Juillerat-Jeanneret
15. Chondrogenesis of bone marrow and peripheral blood derived adult human mesenchymal stem cells
    A Mansor, PP Chong, L Selvareatnam, V Sekaran Nadarajah, T Sara, T Kamarul
16. The attachment of human primary osteoblast cells to oxygen plasma modified PEEK
    AHC Poulsson, RG Richards
17. In vitro study of UHMWPE/MWCNT – Preliminary results
    J Reis, J Potes, F Capela e Silva, A Pereira, S Kanagaraj, M Oliveira, JA Simões
18. Scaffold free generation of inter vertebral disc using rotational culture system
    F Tamura, K Serigano, K Furukawa, Sato M, T Ushida, J Mochida, D Sakai
19. Effect of TGFβ1, BMP-2 and hydraulic pressure on chondrogenic differentiation of bovine bone marrow mesenchymal stromal cells ondrocytes
    S Zeiter, P Lezuo, K Ito