EUROPEAN SOCIETY FOR MUSCULOSKELETAL RADIOLOGY

ESSR CONGRESS
JUNE 9 – 10, 2006
BRUGES / BELGIUM

PROGRAM

www.essr.org

Welcome

Dear Colleagues,

On behalf of the ESSR and the local organising commitee it is a great pleasure for me to welcome You in Bruges, Belgium, to attend the 13th Annual Meeting of the European Society of Musculoskeletal Radiology from June 9 to 10, 2006.

The ESSR 2006 Congress will present two days of scientific papers, poster exhibits, refresher courses and ultrasound workshops.

The main topic of the educational courses of the 2006 congress will be "Knee": 24 "state-of-the-art" lectures by distinguished speakers will present current knowledge and future trends in the anatomy, diagnosis and therapy of diseases which are encountered in this joint.

Hands-on workshops in the musculoskeletal ultrasound at basic and master class levels will provide invaluable practical experience.

Six other half day courses on "Bone marrow imaging", "Whole body imaging", "Paediatric imaging", "Trauma imaging", "Orthopaedic hardware" and "Postoperative imaging" are planned.

The contributions of many people presenting papers or posters in all aspects of musculoskeletal imaging are appreciated.

We hope you will enjoy the social programme the organizing committee has arranged. We invite you to explore and visit the beautiful area of Bruges. There are numerous places to visit in the old city of Bruges…

I am confident that this congress will be both educational and enjoyable. We welcome all members of the ESSR, non-members, guests and companions to this wonderful experience and venue and we look forward to see you in Bruges.

Yours sincerely,

Prof. Dr. K. Verstraete
Congress President ESSR 2006

Table of Contents

Timetable

Friday June 9th, 2006 - Morning

	Ambassador Level 0	Mozart Level 1	Beethoven Level 1	Morus & Erasmus Level 1
08:30	Osseous, Articular, Capsular and Synovial Anatomy of the Knee		Scientific Sessions 1	
	The Clinical Indications for Plain Radiography in Acute Knee Trauma			
09:00	Soft Tissue Structures of the Knee: Evaluation with Ultrasound and MRI	Basics of Musculoskeletal Ultrasound - Part 1		
09:30	MRI - Technical Considerations - MR Arthrography	Basics of Musculoskeletal Ultrasound - Part 2		
	Discussion			
10:00	Coffee break ("De Grote Witte Roos" - Exhibition Area - Level 2)			Ultrasound Hands-on Training
10:30	Imaging of the Normal and Abnormal Patellar Tracking and Femoro-tibial Rotation	How to Image Bone Marrow	Scientific Sessions 2	
	MR Findings in Asymptomatic Knees	Non-neoplastic Marrow Disorders		
11:00	Errors in Interpretation of MR Imaging of the Knee	MR Imaging in Differentiating Osteoporosis from Other Causes of Vertebral Fracture		
11:30	Knee: Overuse Syndromes	Current Status: Imaging in Osteoporosis		
	Discussion	Discussion		
12:00		Industry Meets Science Guerbet	Industry Meets Science Agfa	
12:30	Lunch ("De Grote Witte Roos" - Exhibition Area - Level 2)			

Friday June 9th, 2006 - Afternoon

	Ambassador Level 0	Mozart Level 1	Beethoven Level 1	Morus & Erasmus Level 1
13:30	Medial and Lateral Supporting Structures of the Knee	The History of Musculoskeletal Radiology	Scientific Sessions 3	Ultrasound Hands-on Training
14:00	Bone Marrow Abnormality: Insufficiency Fracture, Avascular Necrosis, Bone Marrow Edema	Musculoskeletal Applications of PET/CT and Whole Body MRI: Results and Ethical Implications		
	Role of MRI in the Evaluation of Knee Stiffness	Whole Body MRI in Metastasis, Muscle Disease and Tumours, including Ethical and Economical		
14:30	Paradigm Shifts in the Treatment of Chronic Arthritis	Molecular Imaging: Musculoskeletal Applications		
	Discussion	Discussion		
15:00	Coffee break ("De Grote Witte Roos" - Exhibition Area - Level 2)			
15:30	Synovial Tumours and Pseudotumours	Paediatric Knee	Scientific Sessions 4	
16:00	Tumours and Tumour-like Lesions of Hoffa's Fat Pad	Paediatric Osteo-Articular Imaging: Inflammatory and Infectious Musculoskeletal Diseases		
	Tumours of the Patella	Trauma and Sport-related Injuries in Children		
16:30	Epiphyseal and Subarticular Tumours and Tumour-like Lesions around the Knee	Bone and Soft Tissue Tumours in Children		
17:00	Surface Lesions around the Knee	Langerhans Cell Histiocytosis: Imaging Findings		
	Belgian Soft Tissue Neoplasm Registry	Discussion		
17:30				

18:30	Mayor's Reception in the Town Hall *(only for registered persons)*
20:00	

Saturday June 10th, 2006 - Morning

	Ambassador Level 0	Mozart Level 1	Beethoven Level 1	Morus & Erasmus Level 1
08:30	Cartilage and Cartilage Repair - Function, Structure and Techniques	Appendicular Skeleton - Lower Limb Trauma in Sports	Scientific Session 5	
09:00	Cartilage Lesions - Degeneration and Osteoarthrosis - Chondral and Osteochondral Injury	Appendicular Skeleton - Upper Limb Trauma in Sports		
	Cartilage Repair	MR Imaging of Shoulder Trauma - Rotator Cuff		
09:30	MRI of Articular Cartilage: New Horizons	Cost-Effective Imaging of the Knee		
	Discussion	Discussion		
10:00	Coffee break ("De Grote Witte Roos" - Exhibition Area - Level 2)			Ultrasound Hands-on Training
10:30	Cruciate Ligament Injuries and Ligamentoplasty - What does the Surgeon expect from the Radiologist	Fractures and Malalignment - Pre- and Postoperative - What does the Surgeon expect from the Radiologist	Scientific Session 6	
11:00	Cruciate Ligament Injuries and Ligamentoplasty - What does the Radiologist offer to the Surgeon	Imaging of Postoperative Ligaments		
	CT and CT-Arthrography of Meniscal Lesions	Knee and Hip Prosthesis - What does the Surgeon expect from the Radiologist		
11:30	Patellofemoral Instability and Chondromalacia Patellae - What does the Radiologist offer to the Surgeon	Imaging of the Failing Hip Prosthesis		
12:00	Economic and Medicolegal Aspects of Knee Injuries	The Post-surgical Spine - Imaging Evaluation Following Spinal Instrumentation and Interbody Fusion		
	Discussion	Discussion		
12:30		Industry Meets Science Genzyme	Industry Meets Science Altana-Bracco	
13:00	Lunch ("De Grote Witte Roos" - Exhibition Area - Level 2)			

Saturday June 10th, 2006 - Afternoon

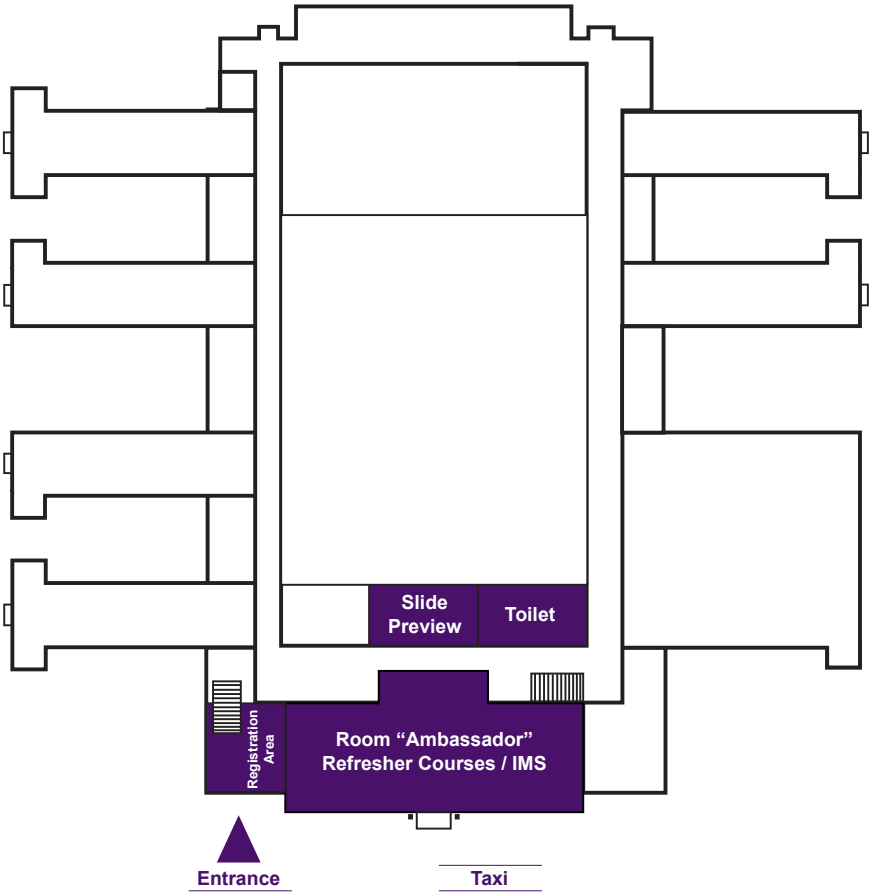
Ambassador
Level 0

14:00	Honorary Membership A. De Schepper
14:30	Presentation of Future ESSR/ISS Meetings
15:00	Film Reading Session
15:30	
16:00	
16:30	General Assembly of the ESSR
17:00	

19:30	Gala Dinner at the "Provinciaal Hof" *(only for registered persons)*
23:30	

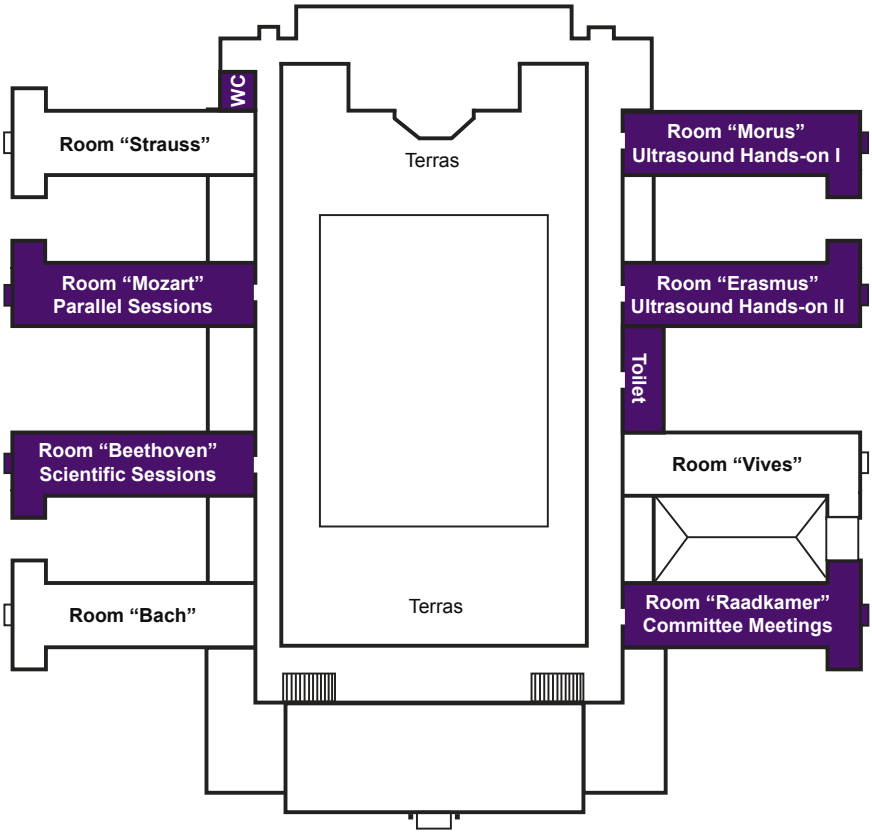
Floorplan

Level 0



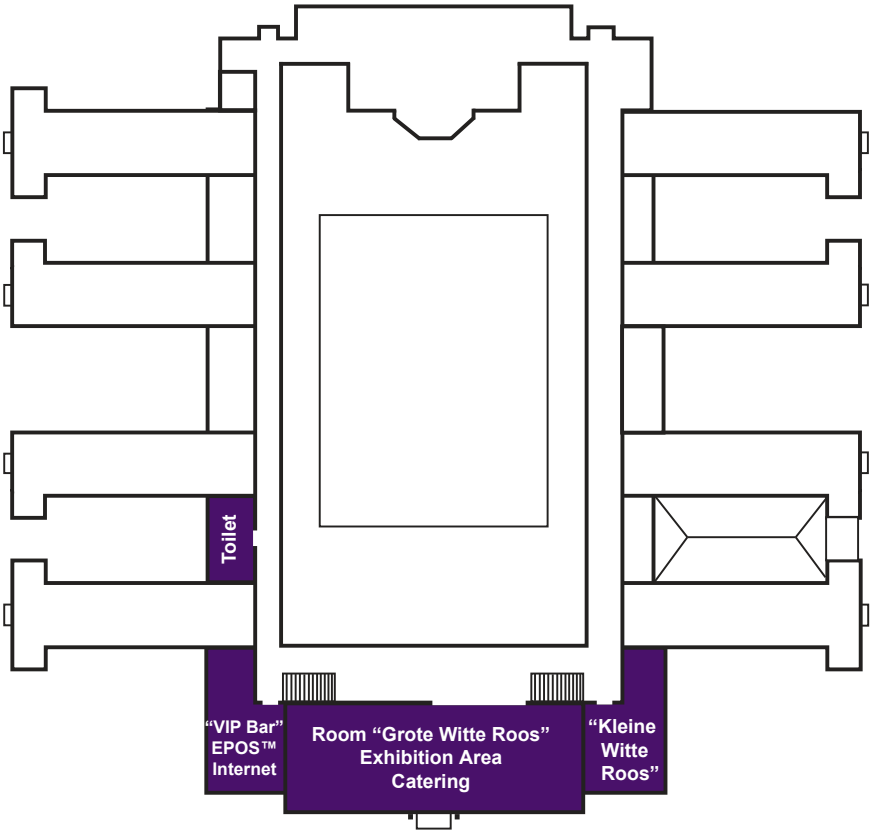
Floorplan

Level 1



Floorplan

Level 2



Committees

Local Organising Committee

Congress president: Prof. Dr. K. Verstraete
Ghent University Hospital, Belgium
Congress Vice-president: Dr. M. Shahabpour
Congress Chair: Prof. Dr. B. Vande Berg
Members: Dr. P. Bracke
Dr. P. Brys
Dr. J. Casselman
Dr. B. Daenen
Dr. K. De Cuyper
Dr. T. De Groote
Dr. V. Devos
Dr. J. Gielen
Dr. W. Huysse
Dr. M. Mespreuve
Dr. B. Stallenberg
Dr. I. Van Breuseghem
Dr. J. Vandevanne
Dr. F. Vanhoenacker
Dr. I. Van Mieghem
Dr. R. Van Tiggelen

International Advisory Committee

J.L. Bloem (The Netherlands)
A. Cotten (France)
V. Cassar-Pullicino (UK)
E. McNally (UK)
I. Beggs (UK)
M. Davies (UK)
F. Aparisi (Spain)
F. Kainberger (Austria)
H. Imhof (Austria)
K. Bohndorf (Germany)
A. Bauer (Germany)
C. Faletti (Italy)
C. Martinoli (Italy)
J. Adams (UK)
A. Karantanas (Greece)
R. Arkun (Turkey)
E. Silvestri (Italy)
P. O'Connor (UK)

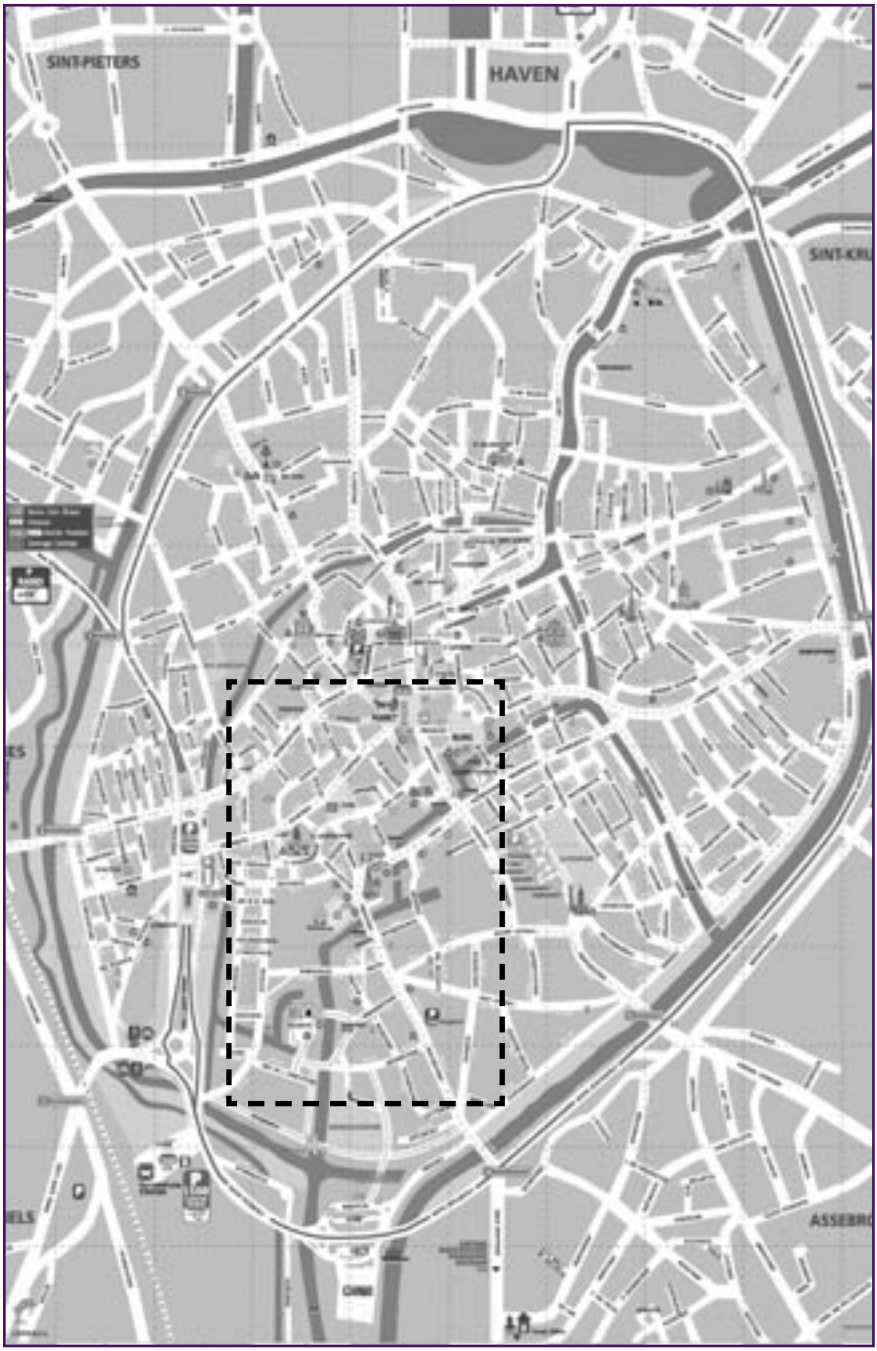
Honorary Committee

Dr. J. Rogge, President of the International Olympic Committee
Mr. P. Moenaert, Mayor of the City of Bruges, Belgium
Prof. dr. P. Van Cauwenberge, Rector of Ghent University, Belgium
Prof. dr. F. Van Loon, Rector of Antwerp University, Belgium
Prof. dr. M. Vervenne, Rector of the Katholieke Universiteit Leuven, Belgium
Mr. P. Demaret, Rector of the College of Europe, Bruges, Belgium
Em. Prof. dr. M. Pensaert, Former Secretary General FWO Vlaanderen
Dr. W. De Groote, Lector at Ghent University, Belgium

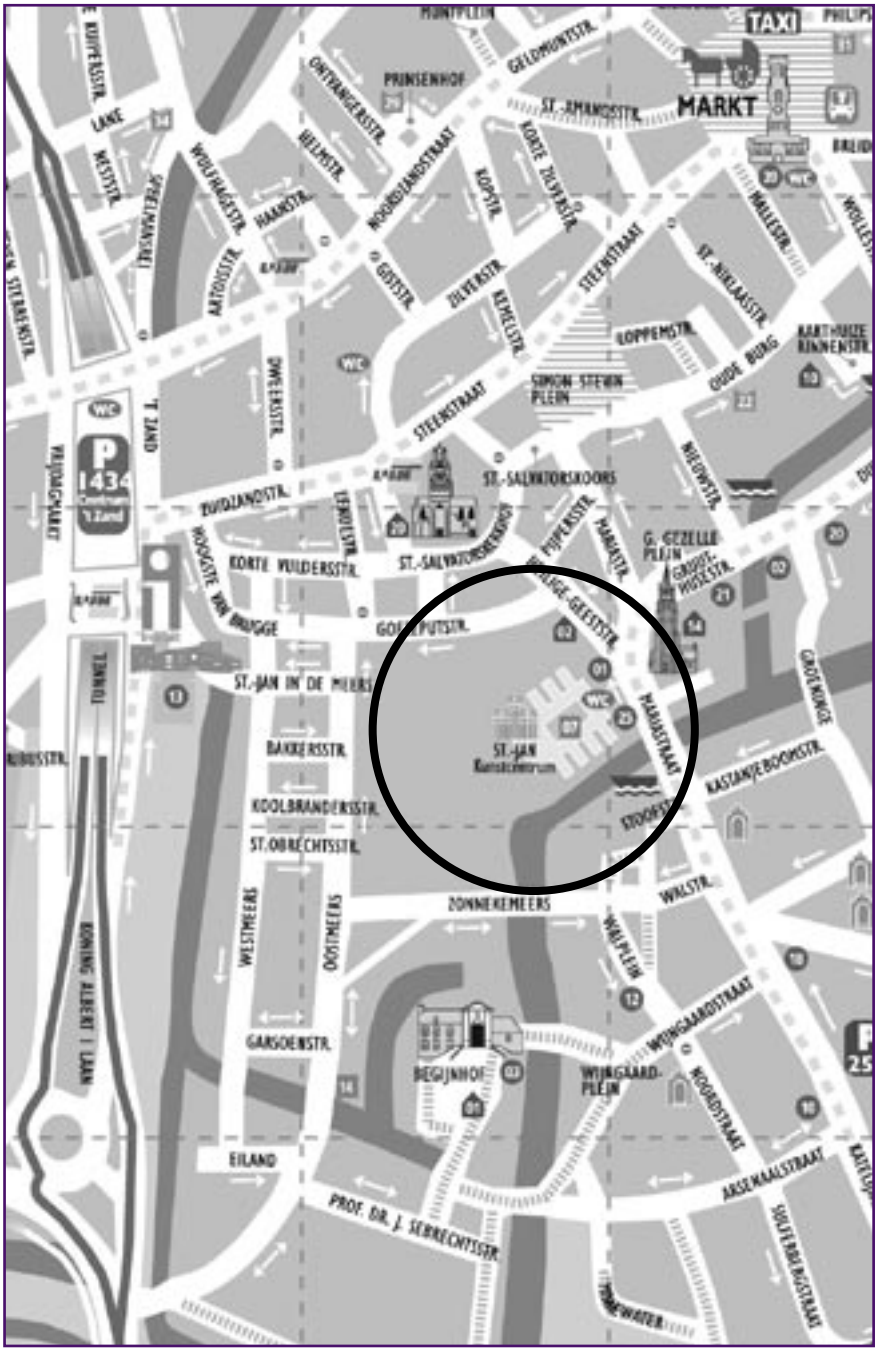
ECR Liaison

P. Baierl
B. Lindlbauer
D. Waigl

Map of Bruges



Map of Bruges



General Information

Venue and Dates

The ESSR2006 Congress takes place at the "Sec@Bruges" (Ancient-Saint-John's) Congress Centre on 9 and 10 June 2006.

"Sec@Bruges" is ideally suited for a medical scientific congress. It is located in the centre of the medieval quarter of the city and within walking distance from the hotels. The short 5 minutes walk to the congress centre will give you a general impression of Bruges's architectural and historic splendour.

Sec@Bruges
Mariastraat 38, 8000 Bruges

Mobile Phone Policy

Delegates are advised that, in accordance with ESSR policy, mobile phones always have to be switched off in the meeting rooms.

Language

The official language of the Congress is English.

Registration Desk, Information Desk and Congress Secretariat

OPENING HOURS:

Thursday, 8 June	16:00-18:30
Friday, 9 June	07:30-18:00
Saturday, 10 June	08:00-18:00

Information on Congress Social Events is available at desks.

Tickets for booked social events are included in your registration documentation. If you cannot attend an event, please, return your ticket to the Information Desk.

Cloakroom

A cloakroom will be open throughout the Congress. It will be possible to store luggage in this cloakroom area.

Lost and Found

For lost and found personal belongings, please, contact the Information Desk in the registration area.

Name badge
Your personal badge is your entrance ticket to all sessions and the exhibition. Please, remember always to wear your badge at Sec@Bruges. If you lose your badge, a new one can be purchased against proof of your original registration, from the Congress secretariat at a cost of 4.00 Euro.

First Aid
In case of emergency, please, contact the Information Desk.

Coffee breaks and Meals
Coffee/tea and lunches are included in the registration fee and will be served daily in the Exhibition Area (Grote Witte Roos).

Climate and Dress
The weather in Bruges at this time of the year is usually sunny with temperatures around 18-20°C. An umbrella might be useful as showers can occur.
Dress will be informal throughout the Congress.

Time Zone
The time zone in Bruges is GMT + 1 hour.

Banks and Post Office
Most banks open at 09.00 and close around 16.00 Monday through Friday. They are generally closed for lunch between 12.30-14.00. Post Offices are generally open between 09.00 and 16.00.
Please, note that there will be no exchange facilities at the Congress Centre.

Electricity
The voltage in Belgium is 220V, 50 Hz.

Technical Exhibition
The Technical Exhibition is held at the Grote Witte Roos.
Opening Hours:

Friday, 9 June	07:30-17:00
Saturday, 10 June	08:00-17:00

Social Program

Mayor's Reception in the Town Hall (*Only for registered persons)*

Friday June 9th, 2006 – 18:30-20:00
Town Hall, Burg 12, 8000 Brugge

Bruges Town Hall dates from 1376 and is one of the oldest in the Low Countries.The Gothic Chamber with its magnificent 19th century frescos and its polychrome vault is a work of art in its own right. The painted figures illustrate the city's glorious past. However, the Town Hall is also the place from which Bruges has been governed for more than 700 years During this reception, everybody will have the opportunity to meet old friends and make new ones.

Included in the registration fees for delegates and registered accompanying persons.

Jousting *(Only for registered persons)*

Friday June 9th, 2006 – 20:00-24:00
Stadshallen, Markt 7, 8000 Bruges

The ESRR 2006 Congress is organized within the walls of the old medieval city of Bruges. Once known as the Venice of the North, this beautiful city is a rich source of historical buildings who themselves were witness of some of the spectacular tournaments of that period.
What better way to taste those splendid times, than being part of a special evening: A unique "Jousting tournament: Speaking Stones, Living Sculptures" in the heart of the old medieval city and witness the re-enactment of parts of the battle between the Flemish knights of the 14th century and the French Kings' army.
This spectacle is brought to Bruges by the international famous Nottingham Jousting Association, who are well know from films such as the Gladiator, A Knights Tale and Robin Hood, Prince of Thiefs .

Time Schedule:
20:00 Medieval dinner at the Belfry
22:30 VIP ticket for jousting tournament (on Market square)

Gala Dinner at the "Provinciaal Hof" *(Only for registered persons)*

Saturday June 10th, 2006 – 19:30-23:30
Provinciaal Hof, Markt 3, 8000 Brugge

From 1285 on stood at this very place the "Waterhalle", wherein the ship could sail. It was demolished from 1787 on: it had lost its anterior function and became very dilapidated. The Kraanlei was overvaulted and a com-

plex of houses was built in classicistic style. Part of these houses was used as Provincial Court.
In 1878 a fire caused lots of damage. This happened in the period of the neo-gothic vague, and because of this they argued in favour of a neo-gothic reconstruction. The Provincial Court (nr 3) and the Post Office (nr 5) were chosen according to the plans of the architects Delacenserie and Buyck. The construction of the Provincial Court started in 1887, but it was only in 1921 that the three left bay-spans were ready.
The white stone facade of the Provincial Court is assymetric: the left wing has three spans, the middle has also three spans, but the right wing has four spans with a passage. The middle part has a floor more and is accentuated as much as the corners with towers. A stone spire with crockets is crowned with finials. The windows are decorated with tracery. The middle part has a hip, the rest of the building a saddleback roof. Both roofs ware cresting.
The facade in the back is made of bricks, and it has a great lancet. The construction of the Post office, made of red bricks, was already completed in 1891. Although the soberer façade-construction quite analog is, it gives a warmer impression.
The building left to the Provincial Court was erected between 1910 and 1914 according the plans of the architecte J.Coomans. It was actually meant to function as residence for the governor. It was never used such as. Actually several public offices are located there. The facade in Belgian bluestone reminds of the Bread House in Brussels but the elegant stair case turret with its round gallery and open worked breastwork reminds of the tower of the Poortersloge. Underneath this building there is a gallery (right to the stair-tower) that changes into a loggia in the first floor.

Medieval Splendours of Bruges

Friday June 9th, 2006 – 10:00-12:00
Departure Point: Sec@Bruges, Conference Center

A fascinating guided tour to this "Venice of the North", Hump-backed bridges, span romantic canals, near little cobbled streets lead past richly decorated Patrician Mansions and all around the enveloping atmosphere of a Medieval city – the 14th century Beguinage, the Burg Square, Chapel of the Holy Blood are just waiting to be discovered.
A boat trip on the picturesque canals of Bruges is included.

Included in the registration fees for registered accompanying persons.

Congress Hotels

	Phone	Fax
Azalea Hotel Brugge Wulfhagestraat 43, 8000 Bruges	050 33 14 78	050 33 97 00
Best Western Premier Hotel Acacia Korte Zilverstraat 3a-5, 8000 Bruges	050 344 411	050 338 817
Best Western Premium Hotel Navarra Sint-Jacobsstraat 41, 8000 Bruges	050 340 561	050 336 790
Golden Tree Hotel Hoefijzerlaan 21, 8000 Bruges	050 338 731	050 342 109
Hotel Biskajer Biskajerplein 4, 8000 Bruges	050 34 15 06	050 34 39 11
Hotel Goezeput Goezeputstraat 29, 8000 Bruges	050 342 694	050 342 013
Hotel Ibis Brugge Centrum Katelijnestraat 65a, 8000 Bruges	050 337 575	050 336 419
Hotel Markies 't Zand 5, 8000 Bruges	050 348 334	050 348 787
Hotel Notre Dame Mariastraat 3, 8000 Bruges	050 33 31 93	050 33 76 08
Hotel Putje 't Zand 31, 8000 Bruges	050 332 847	050 341 423
Novotel Brugge Centrum Katelijnestraat 65B, 8000 Bruges	050 337 533	050 336 556
Sofitel Brugge Boeveriestraat 2, 8000 Bruges	050 449 711	050 449 799

Scientific Information

Certificate of attendance

A certificate of attendance is included in your registration documentation.

CME Credits

European CME credits have been requested with the Accreditation Council for Continung Medical Education. The Belgian Accreditation Council has awarded 30 points for Ethics and Economy. Points for general postgraduate training have been requested.

EPOS™

A number of submitted presentations are available through the electronic poster system EPOS™. You can view them in the room in annex of the technical exhibition space (Grote Witte Roos).

Opening Hours:	
Friday, 9 June	10:00-17:00
Saturday, 10 June	09:00-16:00

Slide Preview Room

The slide preview room is located at the ground floor and will be open from one hour before the first session until half an hour after the last session of the day.
Please, hand in your presentation on CD-ROM (or USB-stick) at least two hours or if possible the day before your presentation is scheduled.

Instructions for Oral Presenters

- Speakers are requested to come to the meeting room at least 10 minutes prior to the start of the session and identify them selves to the chair.

Instructions for Session Chairs

- Before the session, check with the room technician to see if there are no-shows or last-minute changes to the program.
- You must be present in the room 10 minutes before the start of your session to confirm the names of the presenting authors.
- You should instruct each author as to the time allocated to his/her paper.
- Your task is to moderate the session to facilitate both the presentations and the ensuing discussion.
- You should introduce each speaker.
- Please, keep absolutely to the schedule - this allows people to move between sessions with a minimum of confusion.

Scientific Program

Refresher course and State-of-the-art Lectures: Knee Imaging
Room "Ambassador" - Level 0

Parallel Special Focus Sessions:
Room "Mozart" - Level 1
- Bone Marrow Imaging
- Trauma Imaging
- Paediatric Imaging
- Whole Body and Molecular Imaging
- Orthopaedic Hardware Imaging
- Postoperative Imaging

Scientific Sessions
Room "Beethoven" - Level 1

Hands-on Ultrasound – Live Masterclasses
Rooms "Morus" and "Erasmus" - Level 1

Electronic Poster Exhibition (EPOS™)
Room "VIP Bar" - Level 2

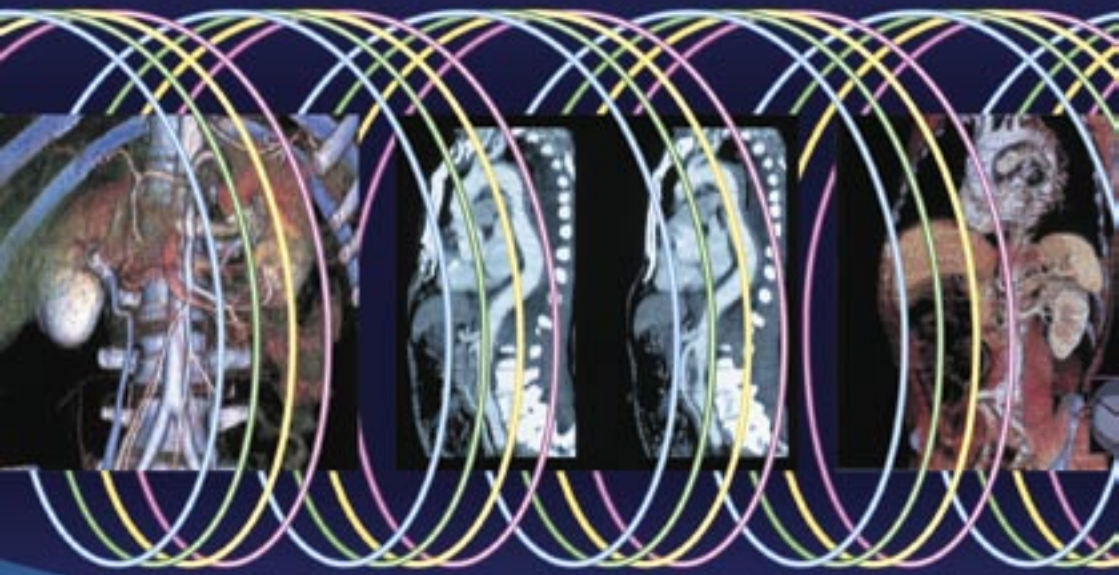
Trade and Technical Exhibition
Rooms "Grote Witte Roos" and "Kleine Witte Roos" - Level 2

Session Chairs

The organising committee of the ESSR 2006 meeting thanks all chairmen listed below for their contribution to the meeting.

Aparisi F. (Spain)
Arkun R. (Turkey)
Astrom G. (Sweden)
Beggs I. (United Kingdom)
Bloem J.L. (The Netherlands)
Boric I. (Croatia)
Bracke P. (Belgium)
Breitenseher M. (Austria)
Brys P. (Belgium)
Burssens P. (Belgium)
Cassar-Pullicino V. (United Kingdom)
Chevrot A. (France)
Daenen B. (Belgium)
De Beuckeleer L. (Belgium)
Devos V. (Belgium)
Drape J.L. (France)
Eustace S.J. (Ireland)
Genant H. (USA)
Gibbon W. (Australia)
Gielen J. (Belgium)
Guglielmi G. (Italy)
Karlinger H. (Hungary)
Kornaat P. (The Netherlands)
Kramer J. (Austria)
Martinoli C. (Italy)
McCall I. (United Kingdom)
O'Connor P. (United Kingdom)
Reiser M. (Germany)
Shahabpour M. (Belgium)
Silvestri E. (Italy)
Sofka C. (USA)
Steyaert L. (Belgium)
Van Breuseghem I. (Belgium)
Van Erkel A.R. (The Netherlands)
Vanderschueren G. (Belgium)
Vandevenne J. (Belgium)
Vanhoenacker F. (Belgium)
Verstraete K. (Belgium)
Vilanova J.C. (Spain)
Watt I. (United Kingdom)
Zanetti M. (Switzerland)

SCHERING
making medicine work



Diagnostic Imaging

Research that's more than just state-of-the-art

Schering offers a wide range
of innovative products
in all major diagnostic areas.

N.V. Schering S.A.
J.E. Mommaertslaan 14
Tel. +32 (0)2/712 85 00
Fax +32 (0)2/720 33 05

www.schering-diagnostics.be

Abstracts

Refresher Course and State-of-the-art Lectures
Knee Imaging
–

Room “Ambassador”
Level 0

Refresher Course and State-of-the-Art Lectures - Knee Imaging
Friday 9th of June - Room "Ambassador" (Level 0)

08.30 - 08.50	Osseous, Articular, Capsular and Synovial Anatomy of the Knee S. Khan (United Kingdom)
08.50 - 09.10	The Clinical Indications for Plain Radiography in Acute Knee Trauma S. Davies (United Kingdom)
09.10 - 09.30	Soft Tissue Structures of the Knee: Evaluation with US and MRI E. Mc Nally (United Kingdom)
09.30 - 09.50	MRI - Technical Considerations - MR Arthrography K. Woertler (Germany)
09.50 - 10.00	Discussion
10.00 - 10.30	Coffee Break / Visit Trade and Technical Exhibition
10.30 - 10.50	Imaging of the Normal and Abnormal Patellar Tracking and Femoro-Tibial Rotation N. Egund (Denmark)
10.50 - 11.10	MR Findings in Asymptomatic Knees M. Zanetti (Switzerland)
11.10 - 11.30	Errors in Interpretation of MR Imaging of the Knee W. Peh (Singapore)
11.30 - 11.50	Knee: Overuse Syndromes M. Padron (Spain)
11.50 - 12.00	Discussion
12.00 - 13.30	Lunch / "Industry Meets Science"
13.30 - 13.50	Lateral Supporting Structures of the Knee M. De Maeseneer, M. Shahabpour (USA, Belgium)
13.50 - 14.10	Bone Marrow Abnormality: Insufficiency Fracture, Avascular Necrosis, Bone Marrow Edema R. Whitehouse (United Kingdom)
14.10 - 14.30	Role of MRI in the Evaluation of the Stiff Knee M. Shahabpour (Belgium)
14.30 - 14.50	Paradigm Shifts in the Treatment of Chronic Arthritis F. Luyten (Belgium)
14.50 - 15.00	Discussion
15.00 - 15.30	Coffee Break / Visit Trade and Technical Exhibition
15.30 - 15.50	Synovial Tumours and Pseudotumours A. Cotten (France)
15.50 - 16.10	Tumours and Tumour-like Lesions of Hoffa's Fat Pad M. Davies (United Kingdom)
16.10 - 16.30	Tumours of the Patella K. Woertler (Germany)
16.30 - 16.50	Epiphyseal and Subarticular Tumours and Tumour-like Lesions around the Knee P. Vincken (The Netherlands)
16.50 - 17.10	Surface Lesions around the Knee S. Anderson (Switzerland)
17.10 - 17.20	Belgian Soft Tissue Neoplasm Registry + Discussion J. Gielen (Belgium)

Refresher Course and State-of-the-Art Lectures - Knee Imaging
Saturday 10th of June - Room "Ambassador" (Level 0)

08.30 - 08.50	Cartilage and Cartilage Repair - Function, Structure and Techniques F. Almqvist (Belgium)
08.50 - 09.10	Cartilage Lesions - Degeneration and Osteoarthrosis Chondral and Osteochondral Injury S. Trattnig (Austria)
09.10 - 09.30	Cartilage Repair S. Trattnig (Austria)
09.30 - 09.50	MRI of Articular Cartilage: New Horizons Ph. Lang (USA / Germany)
09.50 - 10.00	Discussion
10.00 - 10.30	Coffee Break / Visit Trade and Technical Exhibition
10.30 - 10.50	Cruciate Ligament Injuries and Ligamentoplasty What does the Surgeon expect from the Radiologist D. De Clercq (Belgium)
10.50 - 11.10	Cruciate Ligament Injuries and Ligamentoplasty What does the Radiologist offer to the Surgeon T. Pope (USA)
11.10 - 11.30	CT and CT-Arthrography of Meniscal Lesions B. Vande Berg (Belgium)
11.30 - 11.50	Patellofemoral Instability and Chondromalacia Patellae What does the Radiologist offer to the Surgeon Ch. Pfirmann (Switzerland)
11.50 - 12.10	Economic and Medicolegal Aspects of Knee Injuries D. Wilson (United Kingdom)
12.10 - 12.20	Discussion
12.20 - 14.00	Lunch / "Industry Meets Science"
14.00 - 14.30	Honorary Membership: "Symbols in Musculoskeletal Imaging" A. De Schepper (Belgium, The Netherlands)
14.30 - 14.50	Presentation of the Future ESSR / ISS Meetings R. Arkun (Turkey) / P. Munck (Canada)
14.50 - 16.20	Film Reading Session
16.20 - 17.20	General Assembly of the ESSR

Osseous, Articular, Capsular and Synovial Anatomy of the Knee

S. Khan (United Kingdom)

Room "Ambassador" – Friday June 9th, 2006 – 08:30-08:50

An overview of the anatomy of the knee is discussed. With rapid advancement of imaging modalities, the anatomies of various joints have been re-defined. The advent of magnetic resonance imaging with excellent soft tissue contrast and high spatial resolution is able to delineate the anatomy exquisitely in all three orthogonal planes.
Whilst the anatomy of the knee is reviewed, there are various structures that are normal variant or normal structures that can be potentially misinterpreted as abnormal will also be discussed. A number of anatomical structures that are normally present can simulate diseases such as meniscal and ligamentous tears. Pitfalls in the interpretation of knee MR such as the lateral inferior genicular artery mimicking a tear in the lateral meniscus anterior horn or high signal seen on the peripheral slices of menisci which may be due to partial voluming of concave periphery of menisci. The popliteus tendon may be occasionally mistaken for a tear of the posterior horn of the lateral meniscus. The meniscofemoral ligaments can mimic osteochondral body. The speckled appearance of the anterior horn of lateral meniscus that is sometimes seen is considered a normal anatomical variant. Osseous normal variants that can occur include bipartite patella and dorsal defect of the patella. Outline of the capsule and the synovial spaces including the bursae of the knee is also discussed.

References:

1. Herman LJ, Beltran J. Pitfalls in the imaging of the knee. Radiology 1988;167:775-81
2. Watanabe AT, Carter BC, Teitelbaum GP, Seeger LL, Bradley WG. Normal variations in MR imaging of the knee: Appearance and frequency. AJR 1989;153:341-344
3. Vahey TN, Bennett HT, Arrington LE et al. MR imaging of the knee: Pseudotear of the lateral meniscus caused by the meniscofemoral ligament. AJR 1990; 154:1237-1239
4. Mesgarzadeh M, Schneck CD, Bonakdarpour A. Magnetic resonance imaging of the knee and correlation with normal anatomy. Radiographics 1988;8:707-733.
5. De Maeseneer M, Roy PV, Shahabpour M et al. Normal anatomy and pathology of the posterior capsular area of the knee: findings in cadaveric specimens and in patients. AJR 2004;182:955-962.
6. Boles CA, Martin DF. Synovial plicae in the knee. AJR 2001;177:221-227.
7. Lawson JP. Clinically significant radiologic anatomic variants of the skeleton. AJR 1994;163:249-255.
8. Recondo JA, Salvador E et al. Lateral stabilizing structures of the knee: functional anatomy and injuries assessed with MR imaging. Radiographics 2000;20:S91-102.

The Clinical Indications for Plain Radiography in Acute Knee Trauma

S. G. Davies (United Kingdom)

Room "Ambassador" – Friday June 9th, 2006 – 08:50-09:10

This presentation will provide an overview of the decision rules which may be applied to plain film radiography in acute knee trauma.

The presentation will enable the delegate to:
1. describe the original derivation of the Ottawa Knee Rules (OKR)
2. describe the application of the OKR in different settings
3. consider other clinical features which could form part of this decision rule
4. evaluate the use of the OKR by allied health professionals
5. consider application of the OKR in the paediatric population

Clinical decision rules are designed to standardise clinical practice across healthcare domains. They can be effective if well-designed, properly validated, simple to use and sensitive for the clinical problem (Wasson 1985). The OKR is an example of an effective decision rule.

The OKR are described (Stiell 1995) as follows:
1. age 55 or older
2. tenderness of the head of the fibula
3. isolated tenderness of the patella
4. inability to flex the knee to 90°
5. inability to bear weight immediately and in the emergency department

Plain film radiography is performed only in the presence of one or more of these findings

Plain film radiography of the knee following trauma is a common examination. A large number of patients are x-rayed but only 8% of examinations are positive. Application of the OKR can lead to a reduction of 25% or more (Ketelslegers 2002; Stiell 1996, 1997; Emparanza, 2001) in the usage of plain film radiography. OKR can be applied in the paediatric population (Moore 2005) and used by triage nurses (Kec, 2003). However, there is variability of results in both groups (Khine 2001; Matteucci 2003). Other groups (Bauer 1994; Seaberg 1994) have developed different and potentially simpler decision rules but these have not gained widespread use. Haemarthrosis, which is not included in the OKR, has been considered as a criterion (Fagan 2000).

However, a recent meta-analysis (Bachmann 2004) has recommended caution before widespread implementation of OKR. This is on the basis that the cost effectiveness has not been conclusively proven given the pooled sensitivity of 98.5% for fracture detection. This is on the basis of low fracture prevalence and a rule which is calibrated towards 100% sensitivity. However, rules which lead to reduction of radiation dose are highly desirable provided they do not expose the patient to risk of failed diagnosis.

References:

1. Bachmann L, Haberzeth S, Steurer J, Riet G (2004) The Accuracy of the Ottawa Knee Rule to rule out Knee Fractures. A Systematic Review. Ann Intern Med, 140, 121-124.
2. Bauer S, Hollander J, Fuchs S, Thode H (1995) A Clinical Decision Rule in the Evaluation of Acute Knee Injuries. The Journal of Emergency Medicine 13 (5), 611-615.
3. Emparanza J, Agninaga J. (2001) Validation of the Ottawa Knee Rules. Annals of Emergency Medicine 38 (4), 364-368.
4. Fagan D, Davies S. (2000). The clinical indications for plain radiography in acute knee trauma. Injury 31, 723-727.
5. Kec R, Richman P, Szucs, Mandell M, Eskin B. (2003). Can Emergency Triage Nurses Appropriately Utilize the Ottawa Knee rules to Order Radiographs? – An Implementation Trial. Academic Emergency Medicine 10, 146-150.

6. Ketelslegers E, Collard X, Berg B, Danse E, Gariani A, Poilvache P, Maldague B. (2002). Validation of the Ottawa knee rules in an emergency centre. European Radiology 12, 1218-1220.
7. Khine H, Dorfman D, Avner J. (2001). Applicability of Ottawa Knee Rule for Knee Injury in Children. Pediatric Emergency Care 17 (6), 401-404.
8. Matteucci M, Roos J. (2003). Ottawa Knee Rule: A Comparison of Physician and Triage-Nurse Utilization of a Decision Rule for Knee Injury Radiography. The Journal of Emergency Medicine 24 (2), 147-150.
9. Moore B, Hampers L, Clark K. (2004). Performance of a Decision Rule for Radiographs of Pediatric Knee Injuries. The Journal of Emergency Medicine, 28 (3), 25-261
10. Seaberg D, Jackson R. (1994). Clinical Decision Rule for Knee Radiographs. Am J Emerg Med 12, 541-543.
11. Stiell I, Greenberg G, Wells G, McKnight R, Cwinn A, Cacciotti T, McDowell I, Smith N (1995). Annals of Emergency Medicine 26 (4), 405-413.
12. Stiell I, Greenberg G, Wells G, McDowell I, Cwinn A, Smith N, Cacciotti, Sivilotti (1996). Prospective Validation of a Decision Rule for the Use of Radiography in Acute Knee Injuries. JAMA 275 (8) 611-615.
13. Stiell I, Wells G, Hoag R, Sivilotti M, Cacciotti, Verbeek R, Greenway K, McDowell I, Cwinn A, Greenberg G, Nichol G, Michael J (1997). JAMA 278, 2075-2079
14. Wasson J, Sox H, Neff R, Goldman L. (1985) The New England Journal of Medicine 313 (13) 793-798

Soft Tissue Structures of the Knee: Evaluation with Ultrasound and MRI

E. Mc Nally (United Kingdom)

Room "Ambassador" – Friday June 9th, 2006 – 09:10-09:30

Patients with knee disorders may present to the radiology in a number of ways. The most dramatic is the patient with acute haemarthrosis and an inability to fully extend the joint. The commonest cause of a locked knee is a displaced meniscal fragment, though loose bodies and impinging anterior cruciate ligament stumps must also be considered. Not all patients have a mechanical cause however as some soft tissue injuries, most notably medial collateral ligament tears, may result in pseudolocking as a result of muscle spasm. The imaging evaluation of the acutely locked knee remains largely the domain of MRI, which can identify the underlying mechanical block, if one is present, and consequently differentiate patients who need arthroscopy from those who can be managed initially with conservative treatment.

More common but less dramatic are patients who present with symptoms of intermittent locking and giving way. A meniscal tear or cruciate ligament injury are the most common underlying causes. Tears of their meniscus can take several forms. The most familiar pattern is a linear disruption of the structure of the meniscus with extension of synovial fluid into the defect. Cleavage tears can either be horizontal or a vertical. More complex patterns include flap tears were by fragments of meniscus on varying sizes become displaced from the host meniscus. MRI is the best established imaging method for the assessment of meniscal tears though CT arthrography is a reliable alternative. Meniscal and cruciate tears can be identified on ultrasound but there are relatively few studies which show reliable accuracy and reproducibility. Although the reported accuracy results compare favourably with MRI, ultrasound studies looking at meniscal tears do not show the same pattern and range of tears that can be seen on MRI, raising the concern that ultrasound may only be useful for particular tear types. The ability of MRI to directly visualise the anterior cruciate also means that is superior to ultrasound which relies on indirect signs, including haematoma the femoral insertion of the ACL and anterior tibial translation. The posterior cruciate is more amenable to ultrasound interrogation, and large tears can usually be depicted with accuracy. The performance of ultrasound in the detection of smaller intrasubstance tears has not been established. Ultrasound is much more reliable for extraarticular ligament and tendon injuries.

Anterior knee pain is one of the most common and problematic clinical presentations. These are difficult group of patients to evaluate and both ultrasound and MRI have important roles. Ultrasound can reliably assess the quadriceps and patellar tendons and can demonstrate many lesions within Hoffa's fat pad. Its ability to detect patellar maltracking is inferior to dynamic MRI however. MRI is also superior to ultrasound in the assessment of cartilage lesions of the patella femoral joint and it superior contrast resolution generally provides for a more accurate assessment of Hoffa's fat pad.

Patients who present with focal symptoms, either focal tenderness or a mass are best examined initially by ultrasound. Ultrasound can generally determine the nature of a superficial soft tissue mass, most of which are cystic and benign. Popliteal cysts are the most common and the diagnosis can be secured by demonstrating clear communication between the popliteal mass and the underlying knee joint, through the typically located defect between the medial head of gastrocnemius and the semimembranosus tendon. Other common cystic structures include pre and infra patella bursae, pes anserine and semimembranosis bursae, meniscal cysts and cruciate and other ganglia.

Both ultrasound and MRI a well-established in the evaluation of synovial disorders of the knee including patients with rheumatological conditions and those with synovial masses. MRI has the advantage of providing a complete overview of the joint, including areas within the notch where ultrasound has limited access. MRI can make a specific diagnosis of PVNS, however ultrasound is superior to MRI at detecting calcification and can more readily confirm synovial and soft-tissue haemangioma. Both can demonstrate synovial activity with the use of intravenous contrast agents and, in the case of ultrasound, doppler colour flow measurements. Overall quantification in a large joint such as the knee is superior with MRI, which is better for serial studies. The dynamic capabilities of ultrasound however offer several advantages including better clinical correlation, interactivity with the patient and ability to guide aspiration and biopsy.

MRI - Technical Considerations – MR Arthrography

K. Woertler (Germany)

Room "Ambassador" – Friday June 9th, 2006 – 09:30-09:50

Regardless of the MR system used, the knee joint should be examined with a dedicated coil to achieve a sufficient signal to noise ratio. Recent high-field equipment allows for implementation of multichannel coils or parallel measurement with a circularly polarized dedicated knee coil and a flexible surface coil which can be placed over the patella or one femorotibial compartment for high-resolution imaging of specific pathology. Standard imaging parameters are a section thickness of 3(2) mm for 2D and £ 1.5 mm for 3D acquisitions, a field of view of 160 mm, and a high resolution matrix (e.g. 512 x 256). Water-sensitive TSE sequences (e.g. fat-suppressed intermediate weighted TSE, TE = 33-45 ms) obtained in all three orthogonal planes represent the main body of any routine MR examination of the knee. The protocol can be supplemented by a T1-weighted SE/TSE sequence and/or a "cartilage-specific" sequence (SPGR, DESS, etc.). Newly developed pulse sequences that might represent useful adjuncts for knee joint examinations include "arthrographic" sequences with driven equilibrium pulses (e.g. DRIVE) and 3D TSE sequences (e.g. SPACE).

MR arthrography of the knee can particularly be helpful in evaluation of (1) the postoperative meniscus, (2) chondral and osteochondral lesion, and (3) intraarticular loose bodies. The easiest way to puncture the knee joint is by using a lateral approach at the level of the midportion or the superior pole of the patella with a caudocranial (horizontal) tilt of the needle of approximately 30 degrees. Joint effusion, if present, should be drained before administration of contrast media. A volume of 20 mL of a 2.5 mmol/L solution of a gadolinium chelate is usually sufficient to distend the joint. If imaging can not be performed immediately following the injection or if delayed imaging is planned, 0.2 mL of a 0.1% solution of epinephrine hydrochloride may additionally be applied. To provide homogeneous distribution of contrast material the patient should be asked to perform full knee flexions prior to imaging. The imaging protocol should include highly resolved sagittal, coronal, and transverse T1-weighted SE/TSE sequences (with/without fat suppression) and a sagittal fat-suppressed PD/T2-weighted sequence.

References

1. Chung CB et al. MR arthrography of the knee: how, why when. Radiol Clin North Am 2005;43:733-746
2. Coumas JM, Palmer WE. Knee arthrography. Radiol Clin North Am 1998; 36:703-728
3. Imhof H et al. MRI of the cartilage. Eur Radiol 2002; 12:2781-2793
4. Elentuck D, Palmer WE. Direct magnetic resonance arthrography. Eur Radiol 2004; 14:1956-1967
5. Recht et al. MRI of articular cartilage: revisiting current status and future directions. AJR Am J Roentgenol 2005; 185:899-914
6. Stabler A et al. Musculoskeletal MR: knee. Eur Radiol 2000; 10:230-341
7. Woertler K et al. A fast high-resolution multislice T1-weighted turbo spin-echo (TSE) sequence with a DRIVen equilibrium (DRIVE) pulse for native arthrographic contrast. AJR Am J Roentgenol 2005; 185:1468-1470
8. Woertler K et al. MR arthrography in assessment of cartilage lesions of the knee: value of delayed imaging after Gd-DTPA2- diffusion. Eur Radiol 2003; 13(S):132

Imaging of the Normal and Abnormal Patellar Tracking and Femoro-tibial Rotation

N. Egund (Denmark)

Room "Ambassador" – Friday June 9th, 2006 – 10:30-10:50

Background
The extensor mechanism of the knee is composed of the quadriceps muscle group and tendons, the patella, the patellar ligament, the tibial tubercle and the patellar retinaculum. The patello-femoral (PF) articulation centralises the entire extensor mechanism on the anterior surface of the femur. During knee extension, it mediates the forces generated by the largest muscles through the largest lever arm in the body. Minor variations in each component of the extensor mechanism may affect the centralising function of the PF joint by altering the patellar tracking in the femoral sulcus.
At imaging and the biomechanical evaluation of the PF joint, the Q-angle is helpful in the understanding of the function of the extensor mechanism and patellar tracking. It has generally been agreed that in the terminal 30 degrees of extension, the "screw home" mechanism rotates the tibia outward relative to the femur, displacing the tibial tuberosity laterally and increases the Q angle. However, the "screw home" mechanism is not an obligatory effect of the passive joint characteristics, but a direct result of the external load (Blankevoort et al. 1988).

Hypothesis
The normal and abnormal patellar tracking can only be assessed in the standing and weight-bearing position, clinically and at imaging . Supine examination and imaging do at any technique, reflect the function and biomechanics of the standing weight-bearing position.

Imaging
The "screw home" mechanism and patellar tracking can be measured and visualised at MR imaging in the standing position.
Weight-bearing, standing radiography and MR imaging in more than 10 degrees of flexion demonstrate a medial positioning of the patella in the femoral sulcus. In the supine position, the normal lateral positioning of the patella may be visualised.
Medial PF joint space narrowing may be demonstrated by standing views only.
Following traumatic and recurrent patellar displacement, standing axial radiographs will always demonstrate a normal position in the femoral sulcus or medial displacement (and later osteo-arthritis); never a lateral displacement.
In sports medicine, cartilage abnormalities of the patella are most commonly located centrally on the medial facet.

Conclusion
Standing/weight-bearing imaging of the the PF joint should be mandatory in the assessment of the normal and abnormal functions.
As a consequence of the considerations above, surgical treatment with a medial transfer of the tibial tuberosity in patellar displacement should be considered contraindicated.

MR Findings in Asymptomatic Knees

M. Zanetti (Switzerland)

Room "Ambassador" – Friday June 9th, 2006 – 10:50-11:10

MR imaging is widely used for assessing knee pain. Many MR studies have documented a high accuracy of knee MR imaging (1). However, there is a baseline prevalence of MR abnormalities in asymptomatic knees which should be considered when evaluating symptomatic knees. A high prevalence of abnormal findings in asymptomatic volunteers hampers the value of any imaging method in clinical decision making. Meniscal lesions are extremely common in asymptomatic knees (2-5). Comparable to other musculoskeletal regions such as the spine the characterization of the lesion is important. While easily detectable horizontal or oblique meniscal tears are almost symmetrically visible on both knees even in patients with unilateral pain, complex, dislocated and radial tears have a high association to the symptomatic side. Bone marrow edema-like abnormalities, collateral ligament lesions, and peri-ligamentous edema are rarely seen in asymptomatic knees. Meniscal ganglia, cruciate ligament are also rare in asymptomatic knees. Fluid in Baker cysts and in the deep patellar bursa is common. The extension of asymptomatic Baker cysts does rarely exceed 3 cm in the cranio-caudal direction (6).

References:

1. Mackenzie R, Palmer CR, Lomas DJ, Dixon AK. Magnetic resonance imag-ing of the knee: diagnostic performance studies. Clin Radiol 1996; 51:251-257.
2. Boden SD, Davis DO, Dina TS, et al. A prospective and blinded investiga-tion of magnetic resonance imaging of the knee. Abnormal findings in as-ymptomatic subjects. Clin Orthop 1992; 282:177-185.
3. Kornick J, Trefelner E, McCarthy S, Lange R, Lynch K, Jokl P. Meniscal abnormalities in the asymptomatic population at MR imaging. Radiology 1990; 177:463-465.
4. LaPrade RF, Burnett QM, 2nd, Veenstra MA, Hodgman CG. The preva-lence of abnormal magnetic resonance imaging findings in asymptomatic knees. With correlation of magnetic resonance imaging to arthroscopic find-ings in symptomatic knees. Am J Sports Med 1994; 22:739-745.
5. Zanetti M, Pfirrmann CW, Schmid MR, Romero J, Seifert B, Hodler J. Pa-tients with Suspected Meniscal Tears: Prevalence of Abnormalities Seen on MRI of 100 Symptomatic and 100 Contralateral Asymptomatic Knees. AJR Am J Roentgenol 2003; 181:635-641.
6. Tschirch FT, Schmid MR, Pfirrmann CW, Romero J, Hodler J, Zanetti M. Prevalence and Size of Meniscal Cysts, Ganglionic Cysts, Synovial Cysts of the Popliteal Space, Fluid-Filled Bursae, and Other Fluid Collections in As-ymptomatic Knees on MR Imaging. AJR Am J Roentgenol 2003; 180:1431-1436.

Errors in Interpretation of MR Imaging of the Knee

W.C.G. Peh (Singapore)

Room "Ambassador" – Friday June 9th, 2006 – 11:10-11:30

The knee is probably the most frequently imaged joint in current clinical M.R. imaging practice. Errors leading to misinterpretation of M.R. imaging of the knee may be classified as those due to technique and anatomy. As most of these errors are potentially preventable, recognition is important.

Fast or turbo spin echo sequences allow a faster acquisition time but may produce a blurring effect. Fat also remains bright on these sequences and hence, marrow lesions may be missed if fat-suppression has not been applied. Gradient echo sequences are useful for articular cartilage imaging, detection of meniscal lesions and confirmation of the presence of haemosiderin. However, intrameniscal signal tends to be exaggerated and marrow lesions may be obscured due to susceptibility effect of trabecular bone.

Selection of the correct sequences is important. In general, both T1- and T2-weighted images in the same plane are required for tissue characterisation. The menisci are usually evaluated on proton density sequences and cartilage defects on special cartilage sequences. Selection of inappropriate slice thickness and inter-slice gap may produce partial volume averaging, leading to incomplete visualisation of structures such as the cruciate ligaments. Imaging in at least two orthogonal planes is required for evaluation of intraarticular structures.

Artifacts produced during M.R. imaging of the knee include those caused by protocol errors such as wraparound and radiofrequency artifacts, and inherent artifacts caused by random and periodic motion, truncation, chemical shift, susceptibility and the magic angle effect.

Obtaining additional clinical information prior to M.R. imaging helps reduce diagnostic errors, and aids in selection of the appropriate coil, field-of-view, plane and sequence. It is useful to place surface markers in patients with palpable or clinically suspected lumps e.g. subcutaneous lipomas.

Pitfalls in diagnosis of meniscal tears include failure to recognise normal structures such as the transverse ligament, meniscofemoral ligament and the popliteus tendon. Other potential misinterpretation errors may occur in certain injuries such as bucket-handle tears, parrot-beak tears and tears associated with meniscal cysts.

It may be difficult to diagnose a re-tear of a repaired meniscus without M.R. arthrography. Chronic anterior cruciate ligament (ACL) tears may appear normal. ACL tears may be associated with meniscal and collateral ligament injuries, as well as bone bruises.

Knee: Overuse Syndromes

M. Padron (Spain)

Room "Ambassador" – Friday June 9th, 2006 – 11:30-11:50

Overuse syndromes of the knee constitute a group of diseases that arises from excessive motion,repeated microtrauma,inadequate healing or repair or abnormal joint mechanics. Predisposing factors include anatomic variations and improperexercise technique. These disorders may result in permanent changes in soft tissue structures such as tendons with a chronic inflamatory response. The purpose of this presentation is to review the overuse syndromes that primarily affect nonosseous structures including tendinosis of the quedriceps, patellar and semitendinous tendons, iliotibial band friction and Hoffa's syndromes. The most common clinical finding is a chronic anterior knee pain that usually do not require any imaging modality. In certain circumstances imaging will help to make a correct diagnosis or serve as a guide therapy. Soft tissue overuse injuries are best assessed by ultrasound or MRI when patellofemoral joint disease is suspected. If chronic instability of the patella is present with some degree of patelofemoral dysplasia and maltracking, CT or MRI are the most useful imaging modalities.

Lateral Supporting Structures of the Knee

M. De Maeseneer, M. Shahabpour (USA, Belgium)

Room "Ambassador" – Friday June 9th, 2006 – 13:30-13:50

The ligamentous structures on the lateral aspect of the knee include, from anterior to posterior, the iliotibial band, the mid-third capsule, and the posterolateral corner structures. The iliotibial band is involved in iliotibial band friction syndrome, also termed runners knee. At the distal aspect of the mid-third capsule, fibers originating from the ITB, lateral collateral ligament, and biceps tendon insert onto the tibia, in an area where Segond fracture typically occurs. The posterolateral corner structures show many anatomical variations. Ligaments that may be present include the lateral collateral, fabellofibular, arcuate, and popliteofabilar ligaments. In this presentation MR Imaging of these lateral structures is discussed and correlated with anatomical findings.

Bone Marrow Abnormality: Insufficiency Fracture, Avascular Necrosis, Bone Marrow Edema

R. Whitehouse (United Kingdom)

Room "Ambassador" – Friday June 9th, 2006 – 13:50-14:10

Magnetic Resonance imaging of the knee is a common examination, consequently abnormality of the bone marrow in this region is often seen. The most frequently recognised marrow abnormality is "bone marrow oedema", characterised by replacement of the normal fat signal (High on TI and T2, low on STIR or fat suppression) with a water signal (low on T1, high on T2 and high on STIR or fat suppression. Bone marrow oedema is a consequence of many pathologies, not a diagnosis. The commonest cause of marrow oedema is trauma, with the distribution of the oedema often being a clue to the cause.

Spontaneous osteonecrosis of the knee (SONK) is an idiopathic condition that most commonly occurs in the femoral condyle of the middle aged. The term may be a misnomer, marrow oedema rather than marrow necrosis is the predominant imaging feature. There may be a subchondral fracture line in SONK and tears of the posterior third of the adjacent meniscus have also been described, suggesting a traumatic aetiology. Similarities with the hip conditions of transient marrow oedema syndrome and avascular necrosis of the femoral head, with the possibility of progression from the former to the latter gives material for debate but may be misleading when applied to SONK.

This presentation will review the imaging appearances of these conditions.

Role of MRI in the Evaluation of Knee Stiffness

M. Shahabpour, J.M. Annaert, Y. Anciaux, M. De Maeseneer, J. De Mey (Belgium, USA)

Room "Ambassador" – Friday June 9th, 2006 – 14:10-14:30

Purpose and introduction
As for the shoulder joint, patients are often referred to MRI for assessment of a painful stiff knee. Recognition of the cause of the stiffness has an important effect on therapeutic decisions. It could help to avoid unnecessary arthroscopies or may prompt invasive therapy, such as manipulation under anesthesia or arthroscopic capsular release.

Material and methods
In our experience, many of those patients (young or middle-aged and often practicing recreational sports) complained since a long time (a few months to several years) of stiffness and some of them had already one or two standard MR examinations and/or CT arthrography, without relevant findings. Therefore a few patients underwent one or repeated arthroscopies that could be avoided if the lesions had been readily recognized.

Discussion
A stiff knee is usually defined as a knee having a loss of extension or flexion at clinical examination compared to the contralateral joint.
The onset of knee stiffness may be acute and either posttraumatic (as in meniscal, ligamentous or osteochondral lesions) or nontraumatic (as in arthritis or muscular contracture). It may be progressive in traumatic lesions (joint effusion, ligamentous injuries…) or in nontraumatic pathologies (as degenerative or tumoral lesions).
The stiffness can be transitory, like in morning stiffness or after restart of activities, as well as in presence of intraarticular or periarticular adhesions (respectively in arthrosis and in periligamentous or peritendinous fibrosis). It can be prolonged, after immobilization or trauma or even be definitive in severe degenerative osteoarthrosis. The stiffness is experienced in flexion or in extension and ranges from limitation of a few degrees to full stiffness or ankylosis.
- The causes of post-traumatic stiffness include joint effusion: hydrarthrosis (associated to meniscal or pure chondral lesion), hemarthrosis (due to ACL rupture, peripheral capsuloligamentous tear, synovial contusion, patellar luxation or osteochondral fracture), popliteal cyst (Baker's cyst), as well as meniscal locking, recent rupture of ACL, patellar dislocation with articular adhesions, fractures, minor sprain of MCL with retractile scarring, post immobilisation stiffness, …
- Nontraumatic stiffness can be due to bone pathology (reflex sympathetic bone dystrophy, osteonecrosis, malignant tumoral pathology) or be related to articular pathology (joint effusion, cartilaginous pathology (arthrosis), osteochondral lesions, synovial pathologies). In synovial pathology, the origin of the stiffness may be rhumatismal, septic or hematic, from pathological plicae, synovial chondromatosis, pigmented villonodular synovitis or cysts of cruciate ligaments.
- Motion loss is a typical complication after surgery to the knee. It may be secondary to prolonged immobilisation; it is also described after meniscal repair. A few causes have been reported after anterior cruciate ligament reconstruction, including cyclops lesions that can result from repeated graft impingement (ie due to a too anterior tibial tunnel) and arthrofibrosis with postoperative adhesions, a too short or stretched graft due to a too posterior tibial tunnel or a patella infera (secondary to shortening of the patellar tendon after a bone-patellar tendon-bone graft).

Conclusion
MRI proved to be particularly helpful to determine the causes of the stiff knee (including stiffness from traumatic, nontraumatic or postoperative origin) and might lead to improve prevention and treatment strategies.

Paradigm Shifts in the Treatment of Chronic Arthritis

F. Luyten (Belgium)

Room "Ambassador" – Friday June 9th, 2006 – 14:30-14:50

Chronic Arthritis is a major health burden to our Society. The arthritic diseases, leading to loss of joint function and thus personal independence, affect profoundly the quality of life of the patients. The goal of treatment strategies for this group of diseases so far has been to reduce the symptoms and signs with inhibition of joint destruction. The introduction of Disease Modifying Anti Rheumatic Drugs (DMARDs) such as methotrexate has changed substantially the course of chronic arthritis in particular rheumatoid arthritis. The combination of DMARDs has resulted in some improvement, but the recent use of biological targeted therapeutics has revolutionized the field. As chronic arthritis has been regarded as a disease resulting from a disequilibrium in pro- and anti-inflammatory cytokines, recent work has tried to restore this imbalance by using blocking antibodies or soluble receptors against a variety of inflammatory components such as Tumor Necrosis Factor ƒÑ. This approach has demonstrated its success both in Rheumatoid Arthritis and Spondyloarthritis. More recently, other destructive mechanisms partially independent of inflammation have been elucidated, including osteoclast mediated bone resorption driven by the RANKL/RANK system. The control of these other destructive processes has been investigated in recent clinical trials. In addition, there is increasing evidence that intensive treatment of early arthritis results in much better outcomes and more remissions, providing a basis to design and use induction/remission treatment strategies with tight disease control. Despite efficient control of inflammation and destruction, little joint tissue repair has been observed. Abnormal tissue responses such as cartilage calcification and ankylosis may contribute to disease progression and loss of joint function. We propose that ¡§true¡¨ disease remission may only be achieved with appropriate activation of local joint tissue responses leading to restoration of joint homeostasis and recovery of joint function.
Understanding the molecular networks of joint homeostasis, repair and remodelling will be required to achieve this goal.
Defining and validating clinical outcomes evaluating remission remain a challenge.

Synovial Tumours and Pseudotumours

A. Cotten (France)

Room "Ambassador" – Friday June 9th, 2006 – 15:30-15:50

The purpose of this paper is to present differential diagnoses and imaging features of tumours and pseudotumour-like lesions of the articular and bursal synovium arising in the knee. These lesions include pigmented villonodular synovitis, synovial chondromatosis, synovial haemangioma, synovial and ganglion cysts, gout, and malignancies. Radiographic, CT and ultrasonographic features will be discussed, with an emphasis on MR imaging.

Tumours and Tumour-like Lesions of Hoffa's Fat Pad

M. Davies (United Kingdom)

Room "Ambassador" – Friday June 9th, 2006 – 15:50-16:10

A variety of intrinsic and extrinsic tumours and tumour-like conditions may affect the infra-patellar (Hoffa's) fat pad. MR imaging is the technique of choice in evaluating these conditions, but correlation with radiographs is important to identify those lesions producing mineralisation. This review illustrates the spectrum of mass-like lesions that can affect the infra-patellar fat pad, emphasising the radiographic and MR findings that suggest a specific diagnosis.

Tumours of the Patella

K. Woertler (Germany)

Room "Ambassador" – Friday June 9th, 2006 – 16:10-16:30

Patellar tumors are very rare accounting for less than 1 % of all bone tumors. The majority of patients with primary tumors in this unusal location are younger than 30 years of age and present with anterior knee pain or, occasionally, with pathologic fracture. Benign bone tumors and tumor-like lesions of the patella appear to be significantly more common than malignant lesions, with chondroblastoma and giant cell tumor representing the most frequent entities. Other benign lesions that have been reported to occur in the patella are solitary bone cyst, hemangioma, osteochondroma, intraosseous lipoma, osteoblastoma and osteoid osteoma, aneurysmal bone cyst, ganglion cyst, brown tumor of HPT, osteoma, and (very rarely)enchondroma. Malignant lesions include lymphoma, hemangioendothelioma, metastases, and, sporadically, osteosarcoma, malignant fibrous histiocytoma, and plasmacytoma.

Since the patella is relatively small and as a sesamoid bone is predominantly composed of cancellous bone, it typically shows limited reaction in response to an intraosseous lesion and thus, with rare exceptions (e.g. osteochondroma) radiographic findings are relatively unspecific (osteolysis, remodeling). The presence of a soft tissue mass, however, represents a criterion in favour of malignancy. Like in other locations CT and MR imaging can be helpful in differential diagnosis (e.g. cartilage-forming lesions, cystic lesions, GCT, hemangioma, osteoid osteoma) and can demonstrate the extent of a soft tissue component. For differential diagnosis soft tissue lesions with secondary extension into the patella, Paget´s disease, osteomyelitis, and normal variants, such as dorsal defect of the patella and patella partita, have to be considered.

References

1. Kransdorf M et al. Primary tumors of the patella: a review of 42 cases. Skeletal Radiol 1989; 18:665-371
2. Shigeru E et al. Osteolytic lesions of the patella. AJR Am J Roentgenol 1989; 153:103-106
3. Ferguson PC et al. Primary patellar tumors. Clin Orthop Rel Res 1997; 366:199-204

Epiphyseal and Subarticular Tumours and Tumour-like Lesions around the Knee

PWJ Vincken, AR van Erkel, JL Bloem (The Netherlands)

Room "Ambassador" – Friday June 9th, 2006 – 16:30-16:50

The distal femur and proximal tibia are the most common sites for primary bone tumours. Most of these tumours that are located around the knee originate from the metaphyses. Purely epiphyseal tumours are relatively rare.
Osteosarcoma is the most common primary bone tumour (17%). It originates from the metaphysis, but in 75% of cases it extends across the physis into the epiphysis. It has a predilection for the knee region.
Chondroblastoma is the most frequent (benign) tumour around the knee (37% of chondroblastomas occur around the knee) that originates from the epiphysis (40% of chondroblastomas occur in the epiphysis only).
The second most frequent epiphyseal (benign) tumour is Giant Cell Tumour (GCT), 50-65% of all GCT's are located around the knee. Although mainly located in the epiphysis and often abutting the articular surface of the knee, GCT originates from the metaphysis.
Far less common than the aforementioned two tumours are epiphyseal locations of osteoblastoma and osteoid osteoma. Both are more frequently located in the diaphysis and metaphysis of tibia and femur.
Langerhans cell histiocytosis (eosinophylic granuloma) is, when located in long bones, in 2% of cases located in the epiphysis.
Other tumour-like (osteolytic) lesions that are located in the epiphyses around the knee include arthritic lesions that originate from the knee joint (gout, rheumatoid arthritis, tuberculosis, osteoarthritis with degenerative subchondral cyst or geode). Pigmented Villonodular Synovitis of the knee can also cause lytic lesions of the epiphyses.
Another cause of epiphyseal lesions is osteomyelitis, especially in children.

Surface Lesions around the Knee

S. Anderson (Switzerland)

Room "Ambassador" – Friday June 9th, 2006 – 16:50-17:10

no abstract available

The Belgian Soft Tissue Neoplasm Registry (BSTNR)

J.L. Gielen, A.M. De Schepper, P. Van Dyck, F.M. Vanhoenacker (Belgium)

Room "Ambassador" – Friday June 9th, 2006 – 17:10-17:20

Introduction:
Soft tissue neoplasms of the musculoskeletal system have a low prevalence. Based on epidemiological data from the United States of America the total number of new cases of malignant soft tissue neoplasms in Belgium is estimated at 200 a year. This low incidence and the overmedicalization with numerous university hospitals and large general hospitals disposing of MR-equipment(s) limits the number of cases seen per hospital and per year and hampers the acquisition of expertise in the same field.
To cope with these disadvantages the department of radiology of the University Hospital of Antwerp in cooperation with a large number MR centres in Belgium installed a Belgian Soft Tissue Neoplasm Registry ("BSTNR"), starting the registration on January 1, 2001.

Objectives:
The aim of the registry is twofold. Firstly to provide the referring radiologist with a second opinion about diagnosis and differential diagnosis of the presented case within 48 hours (professional service). Secondly to build up a digital archive (data bank) of soft tissue tumours at the disposition of national and foreign researchers (scientific service).

Material and methods:
Until april 2006, 1685 cases are registered, the diagnosis is verified in 842 cases. Cases are registered in the database using international accepted standard procedures in order to guarantee easy availability of the data and to make selection by image related, acquisition related as well as disease related criteria. The WHO diagnostic classification and nomenclature is used.

Results:
The ongoing stream of sent cases illustrates that second opinion of MRI findings in rare pathology is appreciated by referring radiologist and physician. The database proved its differential diagnostic usefullness for the BSTNR board. It is used to select similar cases while making the second opinion report. The database is used to calculate the accuracy of MRI in characterization of soft tissue tumours and tumor-like lesions and to calculate the accuracy of pathological peer review. The behaviour of these tumours on SE-T1-WI with FS and of a large series of neurogenic tumors is described. It reached a critical volume to study MR imaging of very rare tumors. The database is used to add new cases for the third edition of "Imaging of Soft Tissue Tumors", De Schepper eds., Springer Verlag, 2006.

Cartilage and Cartilage Repair - Function, Structure and Techniques

F. Almqvist (Belgium)

Room "Ambassador" – Saturday June 10th, 2006 – 08:30-08:50

no abstract available

Cartilage Lesions - Degeneration and Osteoarthrosis - Chondral and Osteochondral Injury

S. Trattnig (Austria)

Room "Ambassador" – Saturday June 10th, 2006 – 08:50-09:10

Articular cartilage injury is a common disorder in patients referred for knee magnetic resonance imaging (MRI). In a retrospective review of 31510 knee arthroscopies, the incidence of chondral lesions was 63%.
MRI is well established as non-invasive technique to evaluate articular cartilage and allows visualization of cartilage surface, as well as its internal structure, thickness, volume and the adjacent subchondral region.
Clinical MRI of articular cartilage is possible with the use of techniques that provide adequate contrast between articular cartilage and adjacent structures within reasonable imaging times.
A recent review details the MR acquisition protocols for cartilage imaging currently recommended by the Articular Cartilage Imaging Group of the International Cartilage Repair Society. The most commonly used MR imaging techniques are intermediate-weighted fast spin-echo (FSE) without and/or with fat-suppression and three-dimensional (3D) fat-suppressed gradient-echo (GRE) acquisition.
Fast spin echo (FSE) imaging combines the heavy T2 weighting, magnetization transfer effects and relative preservation of high signal intensity in the marrow fat to produce subchondral bone exhibit high signal intensity. Thus, this technique exploits dark cartilage against bright synovial fluid with consecutive high contrast between cartilage and adjacent joint fluid and bone marrow. Intermediate TE weighted FSE depicts intrachondral abnormality. The advantage of fat-suppressed 3D spoiled gradient echo sequences is the relatively high signal intensity of articular cartilage in contrast to low signal intensity from the adjacent fat-suppressed tissue. Three-dimensional acquisitions yield images with higher resolution out of plane and contrast-to-noise ratio than two-dimensional acquisitions. The 3D data set can be used for reformatting in any plane and for 3D visualization and volume measurements. For the optimal evaluation of articular cartilage high resolution is necessary. This can be achieved by the use of surface or microcopy coils on standard (1.5T) MR scanner, which is limited to one compartment of the knee joint or the use of clinical 3 Tesla MR units, covering all compartments. New isotropic 3D-gradient echo sequences such as DESS, True FISP, Balanced-FFE, VIBE and MEDIC, with a voxel size down to 0.5mm for 1.5T with a high gradient strength and in particular for 3T have been developed and seem to be very promising for cartilage imaging. However, the usefulness of these techniques has to be validated in clinical studies.

Biochemical MR visualization of articular cartilage
Intravenous administered gadopentate dimeglumine (Gd-DTPA2-) penetrates the cartilage through both the articular surface and the subchondral bone. The contrast equilibrates in inverse relation to the fixed charged density (FCD), which is in turn directly related to the Glycosaminoglycan (GAG) concentration; therefore, T1, which is determined by the Gd-DTPA2- concentration, becomes a specific measure of tissue GAG concentration.
In practice, cartilage T1 is high in normal cartilage and low in GAG-depleted, osteoarthritic cartilage. The T1 value is determined using a multi-inversion recovery turbo-spin-echo series, followed by curve fitting the T1 images to generate T1 maps.
T2 mapping of articular cartilage is a widely discussed technique in the literature, demonstrating its value in the evaluation of early (ultrastructural) cartilage damage.
In acquiring T2 maps of articular cartilage, classically a multi-echo spin-echo sequence is used, followed by T2 map calculation with a non-linear (i.e., mono-exponential) fitting algorithm. Collagen orientation (determined by the magic-angle effect) and collagen concentration contribute to the T2 values.

Osteoarthritis
Primary osteoarthritis is a gradual process of destruction and regeneration as result of chronic microtrauma (hip, knee, metacarpo-phalangeal and interphalangeal joints), whereas secondary osteoarthritis is a non-inflammatory degenerative joint disease resulting from predisposing events such as previous trauma, congenital deformity, infection or metabolic disorder (shoulder, elbow. foot and ankle). Typically older patients (over 50) are affected unless there is a history of trauma.
In general chondromalacia is often accompanied by subchondral sclerosis, subchondral cysts, osteo-

phytes and/or edema. Progressive loss of articular cartilage is associated with new bone formation and capsular fibrosis.
On imaging a thinning of hyaline cartilage with occasional focal defects with hyperintensity in cartilage on FS-PD-TSE is typically seen.
A decreased signal intensity on T1 with sharp borders may be due to granulation tissue, cysts or sclerosis, with unsharp borders edema is present
Increased signal on FS PD TSE may represent if well demarcated granulation tissue or cysts, if unsharp: edema
Articular cartilage damage in osteoarthritis can be staged as follows: I edema; II articular fissuring; III crabmeat changes; IV full-thickness defect+subchondral erosions
Chondromalacia patellae
It is defined as a degradation and eventually ulceration of hyaline cartilage of the patella usually with underlying bone reactive changes. It affects adolescents and young adults.
Staging is usually done by an MR adaption of Outerbridge arthroscopic grading system:
Grade 1
FS-PD FSE displays focal areas of hyperintensity within normal contour
Grade 2
FS-PD FSE demonstrates blister-like swelling of articular cartilage extending to surface which is seen as fissuring and fibrillation within soft areas of cartilage and extending to 1-2mm within an area of 1.3cm or less in diameter on arthroscopy
Grade 3
FS-PD FSE demonstrates focal ulcerations and crabmeat lesions
Partial thickness cartilage loss (more than 2mm depth and > 1.3 cm in diameter arthroscopically
Grade 4
FS-PD FSE shows full thickness cartilage loss with underlying bone reactive changes
Ulcerations with exposed subchondral bone are seen arthroscopically
Osteochondral injuries
It represents an injury to articular cartilage without or with underlying bone fracture, bone trabecular injury or associated reactive stress response. It occurs in younger active patients, usually < 40 years.
Alterations in contour and/or signal of hyaline cartilage with underlying bone changes may be seen. It affects the weight-bearing hyaline cartilaginous surfaces of the knee with the medial compartment four times more common than the lateral compartment.
It varies from small chondral defect to large areas of cartilage injury including denudation. The cartilage defects may vary from well-defined to irregular defects with flap or full-thickness gaps. Hypointense linear or band-like structures on all sequences may be caused by fracture or trabecular compaction. A free fragment is best visualized on T2* GRE

Cartilage Repair

S. Trattnig (Austria)

Room "Ambassador" – Saturday June 10th, 2006 – 09:10-09:30

Articular cartilage in adults has a limited capacity for self-repair after a substantial injury. Surgical therapeutic efforts to treat cartilage have focused on delivering new cells capable of chondrogenesis into the lesions. In the classic autologous chondrocyte transplanation (ACT) technique chondrocytes are isolated from small slices harvested from a minor weight-bearing area of the injured knee. The extracted cells are then cultured and once a sufficient number of cells has been obtained, the chondrocytes are implanted into the cartilage defect using a periosteal patch over the defect as a method of cell containment. Further improvements in tissue engineering have contributed to the next generation of ACT techniques, where cells are combined with resorbable biomaterials, as in matrix associated autologous chondrocyte transplantation (MACT). These materials secure the cells in the defect area and enhance their proliferation and differentiation. Autologous osteochondral transplantation is another resurfacing technique in which cylinders of autologous bone with overlying hyaline cartilage are cored from non-weight-bearing areas of the knee (donor site) and transferred into similarly sized cored holes created within the cartilage defect to be treated (recipient site). It is a one-stage procedure performed in patients with a symptomatic full-thickness focal chondral or osteochondral defect between 1 and 2 cm.
MR imaging as a non-invasive technique is the method of choice in the follow-up of patients with these different surgical cartilage repair techniques.
MR should be performed with cartilage sensitive sequences such as fat-suppressed PD/T2-FSE or 3D GRE sequences, which provide good SNR and CNR. High spatial resolution is mandatory and can be achieved either by a surface coil with standard MR scanner (1.5T) or with the knee coil at 3T. High resolution imaging is necessary for a better visualization of graft morphology, in particular for the evaluation of transplant integration to the adjacent hyaline cartilage. MR imaging also helps to evaluate the filling of the defect by repair tissue, the surface and structure of repair tissue, the signal intensity of repair tissue with respect to the time interval to surgery and the status of the subchondral bone. In osteochondral autografts the congruity of the articular surface, the osseous incorporation as well as the status of the graft donor site should be assessed. Complications such as periosteal hypertrophy, incomplete and complete delamination, arthrofibrosis and adhesions, incongruencies of the cartilage surface at the repair site, graft failure and reactive changes of the joint such as effusions and synovitis can be visualized.
A recent development of isotropic 3D sequences will further improve the visualization of transplants from different planes and views including virtual arthroscopy. Recent advances in in vivo biochemical imaging such as contrast-enhanced T1 mapping (dGEMRIC) T2 mapping and diffusion-weighted imaging allow a functional analysis of the cartilage repair tissue.

MRI of Articular Cartilage: New Horizons

Ph. Lang (USA)

Room "Ambassador" – Saturday June 10th, 2006 – 09:30-09:50

Unlike conventional radiography, magnetic resonance imaging (MRI) offers the distinct advantage of visualizing the articular cartilage directly. MRI can detect signal and morphological changes in the cartilage and has been used to detect cartilage surface fraying and varying degrees of cartilage thinning.
The standard techniques broadly used in clinical practice and scientific studies are the 2D fast spin-echo and the 3D spoiled gradient-echo sequence. Both sequences are available on most MRI systems.
2D Fast Spin-Echo Imaging: Fast spin-echo (FSE) imaging affords high contrast for evaluating articular disorders and cartilage. Incidental magnetization transfer contrast contributes to the signal characteristics of articular cartilage on FSE images and can enhance the contrast between cartilage and joint fluid. 2D FSE sequences have excellent signal to noise ratios, which help to achieve short scan times in clinical practice. The sequence has fewer artifacts than 3D SPGR 1. Image blurring can be a problem in 2D FSE. Strategies to decrease or avoid image blurring include the use of ultrashort echo times and short echo trains.
3D Spoiled Gradient Echo Imaging (SPGR): SPGR sequences have been employed because of their ability to provide high resolution 3D images. Fat suppression is typically used to increase the dynamic range of signal intensities in cartilage. The hyaline cartilage appears as a high signal intensity structure compared with adjacent tissues which demonstrate lower signal intensities with this sequence. The 3D imaging capability of this sequence has helped transform it into the standard acquisition technique for quantitative cartilage assessment such as 3D volume or thickness measurements. Recent studies indicate, however, that this sequence is hampered by significant image artifacts that can result in over- or underestimation of cartilage disease and failure of automated cartilage segmentation for 3D analysis due to poor contrast between cartilage and surrounding tissue.
Many other MRI sequences have been proposed for cartilage imaging, but have not found wide-spread acceptance. These include T1-weighted, proton density-weighted and T2-weighted spin-echo (SE) sequences, inversion recovery (IR) sequences, magnetization transfer contrast (MTC), and 2D and 3D driven equilibrium Fourier transform (DEFT). Poor cartilage signal-to-noise (SNR) and contrast-to-noise ratios CNR (SE, IR sequences), limited SNR efficiency (SE, IR), need for offline reconstruction (PRSI) or for image subtraction (MTC), and unstable sequence performance (DEFT) are among the factors that have prevented the broad dissemination and acceptance of these techniques for cartilage MRI. The most promising novel MRI pulse sequences for cartilage imaging are water-selective excitation techniques such as 3D spoiled gradient echo with spectral spatial pulses (3D SS-SPGR), 3D steady state free precession (3D SSFP) and 3D fast spin-echo (3D FSE) techniques. These fast sequences hold the promise of providing 3D coverage (unlike 2FSE) while yielding superior contrast-to-noise ratio between cartilage and surrounding tissues and are likely to improve the accuracy and reproducibility of cartilage MRI.
New approaches for assessing the biochemical composition of the articular cartilage non-invasively in vivo include T1-relaxation mapping after i.v. injection of Gadolinium-DTPA (dGEMRIC), T2-relaxation mapping and T1-rho mapping. These hold the potential to detect early biochemical alterations in the articular cartilage prior to the development of irreversible structural changes.

Cruciate Ligament Injuries and Ligamentoplasty - What does the Surgeon expect from the Radiologist

D. De Clercq (Belgium)

Room "Ambassador" – Saturday June 10th, 2006 – 10:30-10:50

1. Although we can discuss the competition in efficiency between radiology (Magnetic Resonance Imaging included), clinical and surgical diagnosis and their economical impact ; the radiology has proven to hold a key position in the cruciate ligaments injuries of the knee.
2. There is an increased reliance of clinical practitioners on the diagnostic information provided by radiology in preoperative clinical decision-making.
3. The main advantages of radiology when used with the integration of patient information, clinical findings and orthopaedic surgeon review ; are its non invasive nature, high accuracy, negative predictive value and cost effective screening technique in evaluating cruciate ligament injuries and their treatment.
4. The diagnostic performance of Magnetic Resonance Imaging (MRI) of the knee differs according to the leasion and the experience of the analyser.
5. Sensivity do not differ between ACL and PCL ligament tears but the specificity is higher for PCL tears than ACL tears.
6. The higher magnetic strenght field modestly improves diagnostic performance.
7. Still some anatomic regions in the knee have a difficult interpretation on radiology but are essential in the outcome of the treatment of cruciate ligament injuries of the knee.

Cruciate Ligament Injuries and Ligamentoplasty - What does the Radiologist offer to the Surgeon

T. Pope (USA)

Room "Ambassador" – Saturday June 10th, 2006 – 10:50-11:10

MR imaging has revolutionized the preoperative evaluation of patients with suspected cruciate ligament injury. Orthopaedic surgeons have developed a dependance on this imaging modality to make an accurate assessment of the integrity of ligaments after a thorough physical examination. Often, the MR is requested to confirm a clinical suspicion but is often used as a problem-solving test. For instance, in the setting of medial pain the MR can help distiguish whether the pain is an MCL injury, meniscal tear, bone contusion or other injury?
In the acute setting MR can provide direct evidence of the integrity of the ligmants which can then allow the surgion to make a decision about the mode of therapy best suited to the patient. If the ligaments are normal, this is a very helpful sign to the surgeon. If there is a cruciate abnormality, MR can often provide the direct location of the cruciate injury (origin, midsubstance or insertion, the degree of the injury (partial or complete) and perhaps just as importantly, identify other associated lesions that will require therapy. Most orthopaedic surgeons must know the associated pathology to appropriately plan their surgery. For instance, if there is a meniscal tear, osteochondral injury or loose intraarticular fragment associated with the cruciate ligament injury, the surgeon must plan a longer time for the procedure and have the appropriate instruments available to adequately and definitively treat all of these injuries at the time of the arthroscopy or surgery. Postoperatively, MR imaging can also be helpful in identifying complications and lack of healing. ACL repair is a common procedure and isometry is critical in planning the tunnels for the ACL graft. The most important complications after ACL repair are rupture and impingement. Rupture is usually not a particularly challenging clinical or MR diagnosis in this setting of ACL repair. Impingement, however, may not be as obvious on physical examination. Generally, the patient loses complete extension of the knee and this is often caused by the fact that the tibial tunnel is partially or completely anterior and drapes across the intercondylar roof. Because of the altered mechanics, a focal fibrous nodule may develop in about 10% of patients anterior to the distal ACL graft. At arthroscopy, this nodule may contain characteristic discoloration resembling an eye and this appearance was the impetus to name this pathology the "cyclops" lesion, or anterior arthrofibrosis. The main MR feature of the "cyclops" lesion is a focal low signal intensity fibrous nodule anterior to the distal ACL graft in the intercondylar notch. This lesion impedes full extension of the knee and the therapy is resection which often results in resolution with the return to near full extension. If patellar tendon grafts are used for the ACL repair, patellar rupture may occur because of the weakened osseous and musculotendinous unit. MR imaging is an excellent tool for diagnosing this abnormality.
This presentation will outline the major MR features of ligament injury in the acute, subacute and chronic phases. Correlation of the imaging findings in one imaging plane with the other MR imaging planes will be stressed. The most common MR features of the complications of ligament replacement will also be shown. The emphasis of the discussion will be on the practical information that we, as imagers, can provide to the orthopaedic surgeons in this setting.

Multi-slice CT arthrography of the knee

B. Vande Berg, J. Malghem, F. Lecouvet, B. Maldague (Belgium)

Room "Ambassador" – Saturday June 10th, 2006 – 11:10-11:30

Developments in spiral computed tomographic (CT) technology with multiple detector arrays enable submillimetric spatial resolution. Spiral CT performed after intraarticular injection of iodinated contrast material represents a valuable imaging modality for the assessment of internal derangements of the knee.

Normal CT appearance of the menisci
Pseudotear created by superposition of fatty tissue on anterior and posterior meniscus horns; Pseudo-tear at menisco-ligamentous junction (see MR imaging); Pseudo-separation (popliteus tendon sheath, lateral aspect of posterior horn of the medial meniscus); Pseudo-tear related to irregularities of the inferior surface of the medial aspect of the posterior horn of the lateral meniscus

Meniscus lesions :
Keeping in mind normal appearance at CT arthrography, several lesion patterns can be recognized: substance loss (altered contour), meniscal tear (contrast material in meniscus substance), and meniscal separation (contrast material between meniscus and capsule). Meniscus fragments can be found in intercondylar space, in superior and inferior recesses of the medial meniscus and in the articular space.

Spiral CT arthrography has a high value for the detection of meniscus lesion (sensitivity : 98 %, specificity : 94 %). Interobserver agreement is excellent (Kappa = 0,899). High value for characterization of stable versus unstable lesions thanks to the high sensitivity for detection of small radial tears (stable tears) and of displaced meniscus fragment (unstable lesions).

Ligament lesions :
ACL contrast material accumulated in focal defect of ligament
atrophic and displaced ligament
MCL contrast material between body of meniscus and capsule (deep MCL tear)
contrast material in proximal aspect of MCL (superficial MCL tear)

Cartilage :
Spiral CT arthrography enables analysis of cartilage thickness and focal substance loss of the entire articular surfaces. The analysis of the cartilage lesion is relatively easy because of the high contrast between defect filled by the high density positive contrast material and low density of normal adjacent cartilage.
Spiral CT arthrography has a high accuracy for deep substance loss but a very low accuracy for detection of superficial fibrillation.

Limitation of spiral CT arthrography
Technical limitations due to the invasiveness of the technique, possible allergic reaction and the use of ionizing radiation.
Clinical limitation include
- the lack of value for the lateral collateral ligament and posterior cruciate ligament
- limited value for the detection of soft tissue disorders
- difficulties in knees with chondrocalcinosis
- no value for bone marrow lesions including areas of bone marrow edema and contusion. Spontaneous osteonecrosis, fractures and reflex sympathetic dystrophy syndrome can be detected.

Patellofemoral Instability and Chondromalacia Patellae - What does the Radiologist offer to the Surgeon

Ch. Pfirmann (Switzerland)

Room "Ambassador" – Saturday June 10th, 2006 – 10:50-11:10

Acute Traumatic Patellar Dislocation:
The role of imaging is to identify sequelae of an acute traumatic patellar dislocation and frequently to diagnose the acute traumatic dislocation.
Acute lateral patellar dislocations are usually transient and patients are often unaware that a patellar dislocation has occurred. Patellar dislocation is not suspected at clinical examination in as many as 45%–73% of cases. MR imaging may help to make the correct diagnosis because of characteristic findings (Elias et al. Radiology 2002, 225:736-43). Bone bruise at the anterolateral femoral condyle (80%) and corresponding at the medial patella (61%) is a classic finding. Medial retinacu-lar injury is common (76% at patellar insertion, 30% at midsubstance) and medial patello-femoral ligament disruption injury is identified in a number of cases (49%). Vastus medialis obliquus edema or hemorrhage is frequently seen (45%).

Chronic Patellar Instability:
The role of imaging is to identify morphologic factors which may lead to chronic patellar instability.

1. Trochlear Dysplasia
Trochlear dysplasia (Malghem et al. 1989, 170:507–510) refers to a depth insufficiency of the proximal trochlear groove which is diagnosed on a straight lateral radiographs of the knee: Criteria for a trochlear dysplasia are a positive crossing sign, where the trochlea is crossing the lateral femoral condyle, a trochlear bump, and the ventral prominence of the trochlear floor of more than 3 mm. On cross sectional images the most accurate measurement is on transverse sections 3 cm above the femoro-tibial joint space where a trochlear depth of 3 mm or less has a sensitivity of 100% and a specificity of 96% (Pfirrmann et al 2000, 216:858-64.)

2. Increased TTTG Distance
A lateralized tibial tuberosity is an important anatomic factor for femoro-patellar instability. For the measurement of the distance between tibial tuberosity and the trochlear groove transverse MR or CT images are suitable (Schoettle 2006, Knee.13:26-31). A TTTG Distance of over 20mm is ab-normal.

3. Patella Alta
Patella alta may be a cause for patello-femoral instability. Patellar height is usually evaluated on straight lateral radiographs. Several measurements have been proposed.

4. Increased Q-Angle:
The Q angle is the angle formed by a line drawn from the ASIS to the central patella and a second line drawn from the central patella to the tibial tubercle. An increased Q angle is a risk factor for patello-femoral instability. The q-angle is a clinical measurement, no imaging is required.

Economic and Medicolegal Aspects of Knee Injuries

D. Wilson (United Kingdom)

Room "Ambassador" – Saturday June 10th, 2006 – 11:30-11:50

The impact of knee injuries depends on the age and occupation of the patient. The injured international footballer is likely to be much more of a burden to his employer than a sedentray office worker. Factors that are important include the severity of the injury, the speed of diagnosis and the effectiveness of therapy.

Imaging has a critical role in prognosis and it allows patients to be treated safely without recourse to invasive diagnostic tests. If the injury detected is one that can be managed conservatively it is far safer and cheaper to reach this conclusion by MRI as oppose to arthroscopy.

All technques have their cost and complications. Even a non invasive test can cause problems if it overdiansoses conditions that need surgical treatment. Therefore there is mortality from MRI albeit one that is very small.

Those with a locked knee may have internal derangement that would require surgical repair or ligamentous damage (MCL tears) that causes pseudolocking and will respond best to non operative treatment. If all cases of locking are subjected to arthroscopy there will be about 40% of unecessary procedures.

The resolution of the equipement, the care taken in examination and the skills of the interpreter all have an imapact on accuracy and therefore risk. Fortunately the knee is relatively easy to image and the impact of poor standards of practice is relatively low.

Degenerative changes are common and many meniscal tears are stable and unsymptomatic. The wise obeserver will try to categorise tears as those that are likely to cause symptoms and those that may be an incidental finding. Most bucket handle and radial tears are unstable. Tears that breach the inferior and superior surfaces are more likely to cause symptoms than those that breech one surface only.

MRI is good hands is a highly accurate technique and arguably it is better at predicting the outcome than arthoscopy. It is probably the ideal methods of judging the extent and nature of injury. Even so, the consequences of each type of injury will vary with many influential factors and MR findings alone cannot predict with certainty the likely degree of disability or discomfort.

Honorary Membership

The ESSR Honorary Membership 2006 will be awarded to Prof. Dr. A. De Schepper for his outstanding contributions to musculoskeletal radiology. His lecture, entitled "Symbols in Musculoskeletal Imaging" is scheduled in the Saturday afternoon session, in the room "Ambassador" (level 0).

Film Reading Session

In this session two teams of experts in musculoskeletal radiology will compete to find answers to the quiz, which will be presented by Dr. V. Cassar-Pullicino in his inimitable and original style. You are kindly invited to attend this traditional film reading session.

The film reading session will be held in the room "Ambassador" (level 0), Saturday 10th of June, starting at 14h50.

Oldelft Benelux

- *Rogan PACS systemen*
  - Uw PACS "op maat" oplossing
- *Triathlon DR buckykamer*
  - Alle RX indicaties met DR
- *Ziehm C-bogen*
  - Innovatieve mobiele scopie
- *MobileDaRt digitaal zaaltoestel*
  - WiFi met Canon FlatPanel
- *MobileArt analoog zaaltoestel*
- *Konica-Minolta CR*
  - Reader voor Bucky + Mammo

Oldelft Benelux bvba
Koralenhoeve 20
2160 Wommelgem
België
Telefoon: +32 (0)3 355 09 50
Fax: +32 (0)3 355 09 55
Website: www.oldelftbenelux.be

Abstracts

Parallel Sessions

–

Room “Mozart”
Level 1

Parallel Sessions
Friday 9th of June - Room "Mozart" (Level 1)

09.00 - 09.30	Basics of the Musculoskeletal Ultrasound - Part 1 F. Kainberger (Austria)
09.30 - 10.00	Basics of the Musculoskeletal Ultrasound - Part 2 C. Martinoli (Italy)
10.00 - 10.30	Coffee Break / Visit Trade and Technical Exhibition
10.30 - 10.50	How to Image Bone Marrow? B. Vandeberg (Belgium)
10.50 - 11.10	Non-neoplastic Marrow Disorders A. Karantanas (Greece)
11.10 - 11.30	MR Imaging in Differentiating Osteoporosis from Other Causes of Vertebral Fracture F. Lecouvet (Belgium)
11.30 - 11.50	Current Status: Imaging in Osteoporosis J. E. Adams (United Kingdom)
11.50 - 12.00	Discussion
12.00 - 13.30	Lunch / "Industry Meets Science"
13.30 - 13.50	The History of Musculoskeletal Radiology E. Pouders, R. Van Tiggelen (Belgium)
13.50 - 14.10	Musculoskeletal Applications of PET/CT and Whole Body MRI: Results and Ethical Implications M. F. Reiser (Germany)
14.10 - 14.30	Whole Body MRI in Metastasis, Muscle Disease and Tumours, including Ethical and Economical Aspects A. Baur (Germany)
14.30 - 14.50	Molecular Imaging: Musculoskeletal Applications Ph. Lang (USA / Germany)
14.50 - 15.00	Discussion
15.00 - 15.30	Coffee Break / Visit Trade and Technical Exhibition
15.30 - 15.50	Paediatric Knee M. de Jonge (The Netherlands)
15.50 - 16.10	Paediatric Osteo-Articular Imaging: Inflammatory and Infectious Musculoskeletal Diseases S. Robben (The Netherlands)
16.10 - 16.30	Trauma and Sport-related Injuries in Children A. Grainger (United Kingdom)
16.30 - 16.50	Paediatric Bone and Soft Tissue Tumours Lesions G. Allen (United Kingdom)
16.50 - 17.10	Langerhans Cell Histiocytosis: Imaging Findings R. Arkun (Turkey)
17.10 - 17.20	Discussion

Parallel Sessions
Saturday 10th of June - Room "Mozart" (Level 1)

08.30 - 08.50	Appendicular Skeleton - Lower Limb Trauma in Sports C. Faletti *(Italy)*
08.50 - 09.10	Appendicular Skeleton - Upper Limb Trauma in Sports M. Padron *(Spain)*
09.10 - 09.30	MR Imaging of Shoulder Trauma - Rotator Cuff L. Steinbach *(USA)*
09.30 - 09.50	Cost-effective Imaging of the Knee A. Van Erkel *(The Netherlands)*
09.50 - 10.00	Discussion
10.00 - 10.30	Coffee Break / Visit Trade and Technical Exhibition
10.30 - 10.50	Fractures and Malalignment - Pre- and Postoperative What does the Surgeon expect from the Radiologist P. Delporte *(Belgium)*
10.50 - 11.10	Imaging of Postoperative Ligaments J. Kramer *(Austria)*
11.10 - 11.30	Knee and Hip Prosthesis What does the Surgeon expect from the Radiologist R. Geesink *(The Netherlands)*
11.30 - 11.50	Imaging of the Failing Hip Prosthesis Ph. O'Connor *(United Kingdom)*
11.50 - 12.10	The Post-surgical Spine - Imaging Evaluation Following Spinal Instrumentation and Interbody Fusion J. Van Goethem *(Belgium)*
12.10 - 12.20	Discussion
12.20 - 14.00	Lunch / "Industry Meets Science"
14.00 - 14.30	Honorary Membership: "Symbols in Musculoskeletal Imaging" – A. De Schepper (Belgium, The Netherlands)
14.30 - 14.50	Presentation of the Future ESSR / ISS Meetings R. Arkun (Turkey) / P. Munck (Canada)
14.50 - 16.20	Film Reading Session
16.20 - 17.20	General Assembly of the ESSR

Basics of Musculoskeletal Ultrasound - Part 1

F. Kainberger, C. Schüller-Weidekamm (Austria)

Room "Mozart" – Friday June 9th, 2006 – 09:00-09:30

Ruptures of tendons or muscles may occur due to direct trauma, but they are more commonly observed as result from indirect trauma at points of greatest weakness within a kinetic chain, so-called critical zones: Repetitive overuse causes degeneration with inflammation at these zones (1, 2). Thus, a torn tendon should be regarded rather as the final stage of a continuously progressive overuse syndrome than as a sudden event as it is experienced by most patients in the form of a striking blow (similar feelings to those reported about the ancient hero Achilles hit by Apollo's arrow are today described by contemporary high-ranking athletes).

Indications: Diagnostic imaging should be performed to describe the type and the stage of tendon overuse with the aims to initiate proper therapy. Conclusions to estimate the risk of a rupture may be drawn from the imaging appearance but this is still under debate.
US is the modality of first choice to detect abnormalities of all superficially located tendons. A potential of MRI is its ability to detect structural abnormalities in more detail, surrounding edema, and associated abnormalities within a kinetic chain. CT may be of use in case of trauma or to analyse calcifications in detail.

Investigation: High-resolution techniques should be applied to document the internal structures of collagen fibers as well as of their gliding tissues (Fig. 1). US is performed with transducer frequencies of more than 10 MHz. Panoramic, or extended view modes are helpful to display the whole course of a tendon. Doppler US may be used to detect inflammatory hyper-vascularisation within the generally hypovascular and bradytrophic tendon tissue.

Interpretation: On high-resolution US images, normal tendon and muscle fibers consist of hypoechoic collagen fiber bundles that appear hypointense with MRI, respectively. They are intermingled between the internal peritendineal tissue that is sonographically hyperechoic and with MRI hyperintense on all sequences except on fat suppressed images. Signs of tendon pathology:
Malalignment: Frequent entities being in close anatomic and biomechanical context with a higher risk of degeneration are the hyperpronation of the hindfoot, flattening of the plantar dome, or different forms of shoulder impingement and of snapping hip.
Structural abnormalities: Tendon degeneration and rupture generally manifest in the form of distinct patterns that are closely related to the type of biomechanical stress and the duration as well as the severity of the disease. Such, four stages of the tendon overuse syndrome (TOS) may be described (3):

- In the first phase of TOS, painful functional impairment of movements occurs without any morphological changes.
- In the second stage, abnormalities of the gliding tissue in the form of bursitis, tendovaginitis, or peritendinitis are observed. Chronic inflammation of the tendon sheath may lead to stenosing tenosynovitis with tendon entrapment.
- In the third stage, such lesions are followed by degenerative changes of the tendon itself. Often, they present more clearly than during the early forms of TOS and three types of tendon degeneration can be differentiated: tendinosis at distinct points along the course of the tendon, fibroostosis at the tendon insertion, and compression or impingement syndromes.
- Rupture of fibers following tendinosis may be considered as the last or fourth stage of TOS and results from the effect of extrinsic and intrinsic risk factors.

In some larger tendons, i. e. the Achilles tendon, the precision of grading may be enhanced by measuring the tendon thickness with the transvers diameter. Various theories have been established which may be grouped in those in which a localised loss of blood supply ("microinfarctions") and those in which increased stress ("microruptures") are attributed to explain the aetiology of such lesions.
Findings in adjacent joints and bones: Joint effusions are commonly observed in major joints. Bone marrow edema may result from repetitive contusions or from traction movements within the subchondral bone.

Differential diagnosis:
Inflammation may be due to infections (abscess formation after penetrating trauma), autoimmunologic disorders (reactive arthritis, early Rheumatoid Arthritis, or others), or may develop as posttraumatic synovitis within tendon sheaths. Metabolic disorders may occur in the form of crystal-induced diseases (including corticosteroids), certain forms of hyperlipoproteinaemia, and anabolic drugs. Space-occupying lesions include ganglia and synovial sheath tumours.

References

1. Jarvinen TA, Kannus P, Paavola M, Jarvinen TL, Jozsa L, Jarvinen M. Achilles tendon injuries. Curr Opin Rheumatol 2001; 13:150-155.
2. Nehrer S, Breitenseher M, Brodner W, et al. Clinical and sonographic evaluation of the risk of rupture in the Achilles tendon. Arch Orthop Trauma Surg 1997; 116:14-18.
3. Kainberger F, Ulreich N, Huber W, et al. Tendon overuse syndrome: imaging diagnosis. Wien Med Wochenschr 2001; 151:509-512.

Basics of Musculoskeletal Ultrasound - Part 2

C. Martinoli (Italy)

Room "Mozart" – Friday June 9th, 2006 – 09:30-10:00

Apart from tendons and muscles, the refinement of high-frequency transducers has improved the ability of ultrasound (US) to detect a wide range of pathologic conditions affecting nerves, joints, ligaments and other soft-tissue structures. Characteristic echotextural patterns, closely resembling the histologic ones, are typically depicted in these structures using high US frequencies. In nerve imaging, systematic scanning on short-axis planes is preferred to follow the nerves contiguously throughout the limbs. With this technique, the examiner is able to explore long segments of a nerve in a few seconds throughout the limbs and extremities. Nerve US can support clinical and electrophysiological testing for detection of compressive lesions caused by nerve entrapment in a variety of osteofibrous tunnels of the limbs and extremities. Congenital anomalies, nerve tears and tumors can be also diagnosed with this technique. As regard joint imaging, US is able to demonstrate only limited portions of the joint surfaces. Tight joints are the most difficult to be evaluated. Large joints are easily examined by means of dynamic manoeuvres that help to reposition the articular surfaces from underneath the bone. US examination of the joint surfaces reveals the subchondral bone plate as a regular, continuous hyperechoic line covered by a hypoechoic band reflecting the hyaline cartilage. Changes in the cartilage thickness can be recognized and measured with US. In osteoarthritis, the cartilage appears thinned, irregular or destroyed, whereas the subchondral bone shows diffuse irregularities. Osteophytes are well depicted. In crystal pyrophosphate deposition disease, aggregates of chondral calcium crystals can be appreciated within hyaline cartilages. Osteochondrosis and osteochondral fractures can be detected as surface irregularities or nidus formation only when affecting joint portions that are amenable to US examination. The intraarticular fat pads appear at US as homogeneous hyperechoic structures. The normal synovial membrane is thin and cannot be detected with US in absence of pathologic conditions that lead to its thickening or hypertrophy. In normal states, small amount of intraarticular fluid located inside the joint cavity can be recognized in most joints. In patients with rheumatoid arthritis and other inflammatory arthropathies, the value of US includes detection of mild synovitis; distinction between synovitis and other causes of joint swelling; less subjective qualitative and quantitative assessment of the disease process; differentiation between effusion and synovial hypertrophy; needle guidance for injection of therapeutic agents, arthrocentesis or biopsy. In addition, the enhanced sensitivity of current Doppler systems makes it possibile to depict the soft-tissue vasculature in and adjacent to bursae, joints and fluid collections. Doppler imaging helps to better characterize inflammatory or infectious collections from noninflammatory ones. Because of their deep location and close contact with the bone, US has limitations to assess paraarticular fibrocartilaginous structures, such as the labrum and the meniscus. Both appear as hyperechoic triangular images adherent to either the peripheral joint capsule or the bone. US demonstrates ligaments as hyperechoic fibrillar bands. Ligaments are anisotropic and change their echogenicity depending on the angle of incidence of the US beam. A careful scanning technique is necessary to avoid false hypoechoic patterns that may mimic pathologic changes because the fibrillar echotexture of ligaments is visible only if the US beam is quite perpendicular to them. Ligaments that stabilize a joint are best evaluated while stretched. Overall, US is an effective modality for imaging the musculoskeletal system. In most cases, a focused US examination can be performed more rapidly and efficiently than MR imaging.

Imaging of Normal and Abnormal Bone Marrow

B. Vande Berg, J. Malghem, F. Lecouvet, B. Maldague (Belgium)

Room "Mozart" – Friday June 9th, 2006 – 10:30-10:50

1. Normal adult bone marrow – Distribution, Composition and MR appearance
Yellow and red marrow contain both a large amount of adipocytes which accounts for their high and intermediate signal intensity on T1-weighted images, respectively. Haematopoietic cells are present only in red marrow and cause a decrease in signal intensity of red marrow on T1- and T2-weighted images. Red and yellow marrow also differ in distribution within the body and in vasculature. Conversion of red to yellow marrow is an age-dependent process in which red marrow that at birth occupies the entire skeleton is progressively replaced by yellow marrow in the peripheral skeleton by the age of 25 (except in proximal femur and humerus). Meanwhile, the proportion of fat cells within the axial red marrow progressively increases. This fundamental process explains the age-related changes in red marrow distribution and composition, which in turn dictate the distribution of most marrow lesions (red areas including skull, axial skeleton, ribs, sternum, pelvis and proximal femurs and humeri).

2 Normal variants in MR appearance of bone marrow
Important variations in red marrow signal intensity and heterogeneity at MR imaging are encountered and several guidelines can be proposed to characterize normal variants. However, a strictly normal appearance of the bone marrow on T1- and T2-weighted MR images does not allow excluding clinically significant alterations of its content.
High signal intensity areas in red marrow on T1-weighted images reflect focal fatty involution, and are clinically irrelevant. Benign vertebral hemangioma (high signal intensity on both T1- and T2-weighted images) is also irrelevant but can be confused with marrow lesions if T2-weighted images only are available.
Low signal intensity areas in red marrow on T1-weighted images are also frequent and correspond to areas of more cellular red marrow. Confusion with marrow lesions is possible and analysis of signal intensity on additional sequences, of distribution in bone and body or obtention of additional imaging techniques may be necessary to avoid unnecessary biopsy.
Hematopoietic marrow hyperplasia frequently occurs in middle-aged women. It can be idiopathic or associated with heavy smoking habit, long distance running and obesity. It is most generally incidentally discovered on routine knee MR examination with low to intermediate signal intensity areas in the distal femoral metaphyses on T1-weighted images in patients older than 25 years.
The marrow signal intensity should remain consistent with that of red marrow on other sequences and the adjacent epiphysis should contain fatty marrow. Significant marrow heterogeneity can be encountered in axial skeleton of patients with red marrow hyperplasia.

3. MR imaging of elementary marrow lesions
Bone marrow diseases induce changes not only in marrow composition but also in marrow distribution. Hence, diseases associated with marrow accumulation of abnormal cells, bone matrix or interstitial substance are often associated with expansion of hematopoietic marrow in Appendicular skeleton. Basically, MR imaging enables recognition of the decrease in the amount of marrow adipocytes that is concomitant to the presence of abnormal marrow component. The T1-weighted spin-echo sequence with its exquisite sensitivity to the presence of fat enables assessment of the fat/non-fat marrow balance in a bone area or in the whole skeleton. The T2-weighted sequences detect changes in water content that are not systematically altered in marrow lesions. Therefore, the T1-weighted sequence represents the corner stone in marrow imaging. It must be emphasized that the decrease in the amount of marrow fat that can be detected at MR imaging completely lacks specificity and the clinical value of MR imaging resides in its sensitivity for lesion detection and not in its specificity. Moreover, elementary lesion patterns at MR imaging can be classified according to their signal intensity, bearing in mind that pattern combinations can result in a spectrum of focal or diffuse signal alterations at MR imaging.

a. Marrow depletion
Red marrow depletion is a pattern characterized on T1-weighted images by a marked increase in signal intensity in comparison to adjacent red marrow. This signal pattern reflects an increase in relative fat content and a concomitant decrease in the non-fat marrow content. Focal red marrow depletion: quiescent lesions, Paget disease, and vertebral hemangioma. Regional red marrow depletion: local radiation therapy.
Diffuse red marrow depletion: steroids, chemotherapy, aplastic anaemia.

b. Marrow infiltration
Marrow infiltration is a pattern characterized by a subtle to moderate decrease in marrow signal intensity on T1-weighted spin-echo images. Margins are generally indistinct with a gradual zone of transition toward normal bone marrow. The term « infiltration » suggests that the abnormal marrow component infiltrates or permeates the normal marrow constituents with some possible residual adipocytes in the lesion. The term bone marrow "oedema" is frequently used to characterize marrow infiltration with high signal intensity on T2-weighted spin-echo images and with normal signal intensity on gadolinium enhanced T1-weighted images because the signal change is consistent with an increase in free water content. Interstitial haemorrhage or fibrosis can alter marrow signal intensity in a similar manner, and the term oedema is frequently inappropriately used.
Focal marrow infiltration: secondary to adjacent lesions (bone fracture, tumour, infection, disc disease…).
Diffuse marrow infiltration: systemic disorders including anaemia, chronic infection, AIDS, bone marrow cancers. Marrow infiltration by neoplastic cells, interstitial fibrosis or storage disorders can result in a similar MR abnormality.

c. Marrow replacement
Marrow replacement is a pattern characterized by a marked decrease in signal intensity on T1-weighted spin-echo images. The term « replacement » suggests that normal marrow component is completely replaced, without residual adipocytes. Margins can be sharp but also indistinct if marrow infiltration is also present. On other sequences, signal intensity and enhancement patterns vary greatly but basically reflect the histopathologic changes of the abnormal marrow component. Differentiating focal marrow « replacement » from « infiltration » is important because marrow infiltration is frequently reactional to changes in adjacent structures and its biopsy is unlikely to be diagnostic. Marrow replacement pattern is non-specific but can be a valuable target for a biopsy if necessary.

4. Lesion detection and characterization with MR imaging
This approach to bone marrow MR imaging can be used to investigate symptomatic patients or patients with a recently discovered marrow disorder, keeping in mind that the major advantage of MR imaging is its sensitivity in lesion detection.
For lesion detection, the T1-weighted spin-echo sequence is frequently sufficient and lesions have low signal intensity. Fat-saturated T2- or intermediate-weighted images are also efficient in lesion detection that will have high signal intensity on a background of low to intermediate signal intensity. In the setting of highly cellular marrow including young women and children, these sequences can become mandatory. T2-weighted sequences are generally not used for lesion detection except in the work-up of patient with multiple myeloma in whom T2-weighted gradient-echo nicely detect high signal intensity lesions. Contrast-enhanced T1-weighted images can be used to differentiate diffusely infiltrated marrow from abnormally cellular albeit normal marrow that generally show only moderate signal intensity enhancement. Most of all, investigation of the pelvis and proximal femurs (coronal images) greatly complement that of the axial skeleton because the pelvic girdle contains a large amount of hematopoietic marrow (isolated lesions) and because diffuse marrow infiltration is more easily recognized in the pelvis than in the axial skeleton by detecting epiphyseal marrow infiltration. Whole-body MR imaging provides the most extensive information on the

marrow status.
For lesion characterization, MR imaging plays little role because it detects decrease in fat content and does not demonstrate changes specific of any abnormal component. MR imaging plays a role in lesion characterization in several situations like the differential diagnosis between benign and pathological spontaneous vertebral fracture. Nowadays, lesion characterization is rarely the role of medical imaging because of the accuracy of blood tests and the availability of biopsy procedures. The radiological pattern of bone lysis/sclerosis or the combination of radiological, bone scintigraphy and MR imaging findings contribute more to a presumptive diagnosis that MR imaging alone.

Non-neoplastic Marrow Disorders

A. Karantanas (Greece)

Room "Mozart" – Friday June 9th, 2006 – 10:50-11:10

Magnetic resonance imaging (MRI) is an imaging technique that allows direct visualization of the bone marrow. Although MRI exhibits high sensitivity, we need an adequate understanding and careful choice of acquisition sequences to improve specificity. Technical improvements providing moving table, new coils and sequences, allow the study of the whole marrow in a reasonable time.
Non neoplastic disease processes involving the marrow - such as trauma, transient osteoporosis, osteonecrosis, arthritis and infection - can induce a variety of imaging findings. The conditions mentioned above are frequently not detected by conventional radiographic techniques until they have reached an advanced clinical stage. The excellent spatial and contrast resolution provided by MRI facilitates early detection and evaluation of various disorders allowing thus prompt treatment. In addition, the association of marrow changes and pain such as in osteonecrosis and osteoarthritis is clinically relevant. For imaging the bone marrow we use a combination of pulse sequences, including T1-w spin echo, T2-w turbo spin echo with fat suppression and turbo-short T1 inversion recovery. In selected cases contrast enhanced T1-w spin echo with fat suppression is applied. Radiological interpretation of the marrow space requires an understanding of normal maturation and recognition that red and yellow marrow coexist with variable amounts depending upon the age and location. With MRI this variability yields normal patterns ranging from very uniform and homogeneous signal intensity to patchy and heterogeneous signal intensity. Signal changes also depend on the pulse sequence applied. The marrow reflects patient health and may herald developing anemia with marrow re-conversion from inactive to active. Disorders to be considered include: a) marrow ischemia and infarction, b) transient osteoporosis of the hip and transient epiphyseal lesions of the knee, c) marrow oedema-like lesions secondary to trauma, stress response, osteoarthritis, tendon pathology, Sudeck's algodystrophy and previous arthroscopy, d) infection, and e) marrow infiltration resulting from disorders such as Gaucher's disease, hemoglobinopathies and myelofibrosis.

MR Imaging in Differentiating Osteoporosis from Other Causes of Vertebral Fracture

F. Lecouvet, B. Vande Berg, J. Malghem, B. Maldague (Belgium)

Room "Mozart" – Friday June 9th, 2006 – 11:10-11:30

The occurrence of spontaneous vertebral fracture is frequent in elderly patients and early recognition of an underlying malignant lesion (malignant spontaneous vertebral fracture) is important for proper management. This differential diagnosis between benign (osteoporotic) and malignant fractures is occasionally difficult and relies on a logical and sequential multi-modality imaging approach. Conventional radiographs remain the first line imaging tool for the work-up of a vertebral fracture and are sufficient in the vast majority of cases for the confident evaluation of the benign or malignant origin of these fractures.
MR imaging is the method of choice if this differential diagnosis is unclear and if the clinical settings are suggestive of malignancy. The following principles highlight imaging features that distinguish benign from malignant fractures. The limits of this semiology and exceptions to general rules must be underlined.

The following characteristics are suggestive of the benign origin of a fracture.
Principle 1 : a benign spontaneous vertebral fracture is related to diffuse bone weakening and its characteristics are dictated by spine biomechanics. The topography along the spine and in the vertebral bone of the fracture as well as the shape of the deformity are dictated by biomechanical principles. Benign vertebral fractures largely predominate at the thoraco-lumbar junction due to compressive stress along the spine. Benign spontaneous vertebral fractures are not observed at the cervical segment or in the upper thoracic (above T4) segment because of reduced stress. Benign fractures involve the vertebral bodies, and the posterior arch is spared in benign vertebral fractures; anterior wedge shape deformity is most frequently observed (due to cyphosis at the thoracic spine and protection afforded by the posterior arch).
Principle 2 : a benign spontaneous vertebral fracture occurs in an area of previously normal bone and marrow content. The changes observed within the trabecular and cortical bone and within the soft tissue are related to the fracture and are observed adjacent to this fracture. The trabecular bone can be fragmented and/or sclerotic. The cortical bone can be interrupted, fragmented but not largely resorbed. Marrow edema is present but not marrow replacement. Minor and circonferential soft tissue swelling can be seen but there should not be any mass effect.
Principle 3 : in a benign spontaneous vertebral fracture, almost any feature can be observed at the fracture site but nothing should be seen at distance from it (i.e. in the posterior arch of the fractured vertebra, other lesions along the spine, in the pelvis, …).

Derived from the above mentioned characteristics, malignant spontaneous vertebral fractures may show features that rule out the possibility of a benign origin of the fracture.
Principle 1 : a malignant spontaneous vertebral fracture is related to focal weakening of bone strength. Topography along the spine and in the vertebra and the shape of the deformity are related to the topography of the underlying lesion.
Principle 2 : a malignant vertebral fracture develops in an area of abnormal marrow. The appearance of bone and soft tissues is modified by the fracture but also by the pre-existing lesion. Marked loss of trabecular and/or cortical bone, round foci of marrow replacement, bulging of tumor through a cortical bone defect can be seen; given the presence of a tumoral mass, compression of the vertebral body causes displacement of the cortical bone (if not destroyed) or soft tissue mass when the bone is destroyed.
Principle 3 : a malignant spontaneous vertebral fracture often develops in patients with multiple marrow lesions that can be detected on MR images, or by other imaging modalities (bone scan, …).

Beside soft tissues and posterior elements involvement that is indicative of a malignant origin, MR imaging patterns of marrow abnormalities are cardinal for correct categorization of the fracture.
In acute benign vertebral collapse, marrow edema or haemorrhage will be responsible for band-like signal changes of low signal intensity (SI) on T1-, intermediate to high on T2-, and "return" to normal marrow SI on enhanced T1- weighted images: "marrow infiltration".
In malignant fractures, although marrow infiltration may be present, more severe and heterogeneous marrow signal changes will be observed on T1-, on T2-, on enhanced T1- weighted images:

"marrow replacement" (by the underlying malignant lesion).
If the differential diagnosis remains uncertain after a "classical" MR imaging study, several options may be proposed: additional sequences (dynamic study of contrast enhancement, diffusion weighted MR sequences, …), comparison to other techniques (CT), follow-up (benign lesions will be spontaneously resolutive over several weeks), or more invasive approach (biopsy,…).

Exceptions and particular settings
- When the disruption of the vertebral endplate is large, herniation of disk material though the fractured endplate within the vertebral body may create focal defect within the trabecular bone and induce bone marrow signal changes that may cause the appearance of pseudo-malignant involvement of the vertebral body.
- "Spontaneous vertebral osteonecrosis" is a fracture that is observed in patients with a previous history of corticoid or radiation therapy, characterized by a marked vertebral collapse in which a vacuum phenomenon can be seen, especially when distraction stress is applied. Given the possibility of important vertebral collapse, compression of neural structures can be observed (normally not seen in benign fractures).
- Multiple myeloma causes diffuse marrow infiltration which is occasionnely "microscopic" without any evident focal marrow lesion in given vertebral bodies … or even in a whole spine. In that disease, many fractures may appear benign in terms of topography along the spine, in terms of shape of the vertebral deformity, and in any terms of MR appearance, which underlines the critical role of diffuse bone strength weakening in the pathogenesis of these fractures.

Current Status: Imaging in Osteoporosis

J.E. Adams (United Kingdom)

Room "Mozart" – Friday June 9th, 2006 – 11:30-11:50

Introduction
Osteoporosis is the most common metabolic bone disease, affecting 1 in 3 postmenopausal women and 1 in 12 men in their lifetime. The disease is characterised by reduced bone mass and deterioration in trabecular structure. The clinical consequence is low trauma fractures, particularly in the spine, wrist and hip. All may be associated with pain and deformity, and hip fractures cause significant mortality. In the past there was little effective bone protective or enhancing therapy, but now this is not the case. Supplementary calcium and vitamin D, bisphosphonates, selective oestrogen receptor modulators (SERMs), strontium ranelate and teriparatide increase bone density and reduce future fracture risk. It is therefore relevant to identify patients at risk, preferably before fractures occur. Radiologists have an important role to play in this objective. There are features on radiographs that radiologists should recognise and report clearly and suggest that the patient be referred to a clinician with a special interest in osteoporosis management and that bone densitometry be performed to confirm the diagnosis. Imaging techniques also play a role in differentiating acute from old and stable osteoporotic fractures (relevant to the selection of patients appropriate for vertebroplasty), and in confirming that fractures are related to pathologies (metastases, myeloma) other than osteoporosis.

Causes of osteoporosis

Osteoporosis may be generalized or regional:
Generalised: the most common cause is the bone loss that occurs with ageing (senile) and in women after the menopause (postmenopausal). Osteoporosis can be associated with endocrine disorders (Cushing's disease, thyrotoxicosis, hyperparathyroidism), medications (glucocorticoid therapy, heparin), deficiency states (scurvy, malnutrition), osteogenesis imperfecta and other miscellaneous conditions (excess alcohol consumption, coeliac disease, cystic fibrosis).
Regional: this can occur in a limb with disuse (e.g following a fracture or stroke) and around joints in inflammatory diseases (rheumatoid arthritis). There are also specific conditions which include reflex sympathetic osteodystrophy (Sudeck's atrophy) and transient osteoporosis of the hip.

Radiographic features

With loss of bone mass the bones appear more radiolucent (osteopenic). The bone cortex becomes thinned and trabeculae are reduced in number. In the vertebrae horizontal trabeculae are first to be lost, with preservation of primary vertical trabeculae; this results in a prominent vertical striated appearance. In the proximal femur principal compressive and tensile trabeculae are accentuated, with reduction in trabeculae in Ward's area.
Fractures: vertebral fractures are defined as wedge, endplate or crush. They are powerful predictors of future fracture (hip X2; vertebral X5). It is important that they are accurately reported by radiologists. There is currently a joint initiative between the International Osteoporosis Foundation (IOF) and the European Society of Skeletal Radiology (Osteoporosis Group – Past Chairman Professor JE Adams; Current Chairman Professor Thomas Link) to improve the sensitivity and accuracy of reporting of vertebral fractures by European radiologists and an interactive teaching CD is available (www.osteofound.org)

Fractures also occur in the wrist and hip. Micro-fractures can occur, particularly in the sacral alar, pubic rami and calcaneus. There may be profuse callus formation mimicking other pathologies. These micro-fractures may be difficult to identify on radiographs due to superimposition of structures (e.g. bowel overlying sacrum), and radionuclide bone scans (RNS), CT and MR imaging may be required ('Honda' sign of sacral fractures) for identification. These imaging methods are also relevant to differentiating osteoporotic fractures from fractures due to other pathologies (metastases, myeloma).

Vertebroplasty has selected application in patients with osteoporotic vertebral fracture that are persistently painful. Although performed by several medical specialists, radiologists are probably the most appropriate group to perform this image-guided interventional technique, particularly as imaging (radiographs, RNS, CT and MR) plays a role in selecting patients appropriate for the procedure.

Bone densitometry

Dual energy X-ray absorptiometry (DXA) uses ionising radiation (albeit extremely low doses [1-6 iSv]) and radiographers constitute the most common technical operators. The equipment would therefore be housed appropriately in radiology departments. DXA of the hip and spine is currently the 'gold standard' for the diagnosis of osteoporosis by bone density (WHO definition T score below -2.5). Radiologists have the appropriate training and expertise to scrutinise the images and recognise abnormalities that can result in errors in DXA measurements (osteophytes in lumbar spine) and for identifying vertebral fractures on DXA images. The latter is now feasible through improved spatial resolution (originally 1mm; now 0.35mm), faster fan beam scanning and, on some scanners, a 'C' arm so that repositioning in the lateral position is not required. There are some limitations of DXA (size dependency) which do not apply to Quantitative Computed Tomography (QCT), which can be applied to axial and peripheral skeletal sites. Whereas DXA scanners can be located in other departments, CT body scanners will always be sited in radiology departments. There is increasing interest in examining how bone size influences bone strength, and the interaction of muscle and bone. CT can provide not only true volumetric bone density (mg/cm3), but also cross-sectional area of muscle and bone, and from the latter can be derived biomechanical parameters (stress strain index; moment of inertia). It is therefore essential that radiologists take an increased interest in this fertile field of clinical research and diagnosis.

Conclusion

Radiologists play a crucial role in the identification of patients with osteoporosis by recognising specific features or fractures on radiographs, particularly vertebral fractures. Imaging plays a role in differentiating fractures that are acute and due to osteoporosis from those due to other pathologies, and in selecting those patients who would be appropriate for vertebroplasty.

Suggested further reading;

1. Bone Densitometry and Osteoporosis. Editors Genant HK, Guglielmi G, Jergas J Springer Verlag Berlin Heidelberg 1998. ISBN 3-540-63149-6
2. Radiology of Osteoporosis. Editor Grampp S. Springer Verlag Berlin Heidelberg 2003. ISBN 3-540-66827-6
3. Imaging in Metabolic Bone Disease. Seminars in Musculoskeletal Radiology 2002;6, Part 1. Guest Editor Adams JE.
4. Ferrar l. Jiang G, Adams J, Eastell R. Identification of vertebral fractures: an update. Osteoporosis International 2005;16:717-728

The History of Musculoskeletal Radiology

E. Pouders, R. Van Tiggelen (Belgium)

Room "Mozart" – Friday June 9th, 2006 – 13:30-13:50

SINCE 1895, ORTHOPAEDIC SURGERY NEEDS X-RAY IMAGING: A HISTORICAL OVERVIEW.

The first application of X-ray techniques to human beings was made in Germany by Wilhelm Conrad Röntgen in November 1895. From this first use, different groups became interested in creating and improving the technical devices. We present some of the milestones in X-ray imaging, from the first pioneer's approach on glass plates, cathode X-ray tubes, fluoroscopy, earlier communications leading to X-ray films and screens, x-ray rotating tubes,tomography, ultrasounds,CT and MRI, in radiological techniques and orthopaedic pathology.

Musculoskeletal Applications of PET/CT and Whole Body MRI: Results and Ethical Implications

M.F. Reiser (Germany)

Room "Mozart" – Friday June 9th, 2006 – 13:50-14:10

Purpose: To describe the methods and possible musculoskeletal applications of PET/CT and whole body MRI (WB-MRI) and to discuss ethical implications, when these methods are considered for screening.

Methods: PET/CT and WN-MRI were applied in primary bone and soft-tissue tumors, skeletal metastases, inflammatory joint diseases as well as muscle diseases. Diagnostic accuracy and impact on patient management were analyzed.

Results: PET/CT and WB-MRI exhibit higher sensitivity and spenficity in the assessment of skeletal meastases then bone szintigraphy and radiography. WB-MRI is superior to PET/CT due to its higher spatial resolution. In malignant bone and soft-tissue tumors, WB-MRI enables for more precise diagnosis of tumor extension in preoperative planning. In inflammatory joint diseases, also clinically asymptomatic manifestations were detected. The involvement of various muscle groups in inflammatory and neuropathic muscle diseases is readily assessed so that an adequate biopsy site can be identified.

Discussion: In imaging of potentially systemic diseases, PET/CT and WB-MRI allow for comprehensive diagnosis and are suitable to replace a cascade of multiple imaging procedures. Screening in asymptomatic patients has no evidence- based benefits and has to be counterbalanced with costs, radiation exposure and possible adverse effects and complications.

Whole Body MRI in Metastasis, Muscle Disease and Tumours, including Ethical and Economical Aspects

A. Baur (Germany)

Room "Mozart" – Friday June 9th, 2006 – 14:10-14:30

In MRI, different techniques, like the total imaging matrix system (TIM-Siemens), or a rolling table platform (Angiosurf MR-innovation) or the 3 D continuously moving table SENSE (Philips) allow a whole body imaging approach of the skeleton in 20-40 minutes. As sequence protocol, in general, the combination of T1-w SE and STIR images are recommended. The diagnostic value of whole body MRI has been shown in patients with multiple myeloma and patients with multifocal metastases. Further in patients with polymyositis/dermatomyositis, muscle dystrophia type Duchenne and lymphomas. Further possible indications are histiocytosis, CRMO or SAPHO disease and systemic developmental diseases such as polyostotic fibrous dysplasia and multiple osteochondromas. First results showed a higher sensitivity of MRI for the detection of bony metastases and myeloma when compared to MDCT and scintigraphy. Preliminary results have shown a slight advantage over PET-CT for the diagnosis of metastases. The direct display of bone marrow components is the major advantage of MRI. Bone marrow infiltrates are imaged before osteoclastic or osteoblastic activities occur. The major advantage of MDCT is to show the extent of the ossesous destructions, the determination of fracture risk and planning of surgery. The high data amount is a challenge for the radiologist which implies the need for a systematic image evaluation.

Molecular Imaging: Musculoskeletal Applications

Ph. Lang (USA)

Room "Mozart" – Friday June 9th, 2006 – 14:30-14:50

The visualization of specific molecular events holds great promise for both clinical and basic sciences applications in musculoskeletal radiology. Molecular imaging can be defined as the imaging of specific biological processes at the molecular and cellular level in living organisms.1 Numerous applications exist for a molecular imaging approach in the musculoskeletal system and general categories include arthritis, bone and joint healing, bone marrow abnormalities, osteogenesis regulation, bone remodeling, osteoporosis, tumor imaging, and therapy assessment.

In recent years there has been intense interest in molecular imaging due in large part to the rapid advances in our understanding of specific molecular pathways related to the musculoskeletal system. Contributions in fields such as biochemistry, molecular biology, cellular biology and genetics have lead to a greater fundamental understanding of the molecular and cellular processes both normal and disease states. However, much of the fundamental basic science work relies on in vitro study or examination of large populations of animals at single points in time. What is needed are imaging tools to examine molecular events at multiple points in time in living systems. The goal for molecular imaging is to reveal the early underlying biochemical and genetic events responsible for disease rather than late changes (e.g. tumor size or altered blood flow) as seen with most current clinical diagnostic imaging modalities.

A few examples exist in the literature or are in active development for musculoskeletal application. Beckmann et al. have shown that the macrophage phagocytosis of super-paramagnetic iron oxide particles produce MRI signal changes that correlate with arthritis severity and the response to treatment in an antigen-induced arthritis rat model.2 18F-FDG PET imaging shows potential for monitoring disease activity in rheumatoid arthritis (RA)3 and novel molecular probes have been tested and are under development using radiolabeled antibodies specific to markers of inflammation4, 5 or pannus formation in RA. Tracking of hematopoietic stem cell engraftment with a molecular imaging approach may provide an alternative/adjunct to invasive bone marrow aspiration.6 The disease progression of multiple myeloma can be visualized in a mouse model with in vivo whole body mouse fluorescent imaging.7 Fluorescence imaging can visualized events in tumors located close to the skin surface8 and one potential application might be therapy monitoring of soft tissue tumors.9, 10

Molecular imaging promises non-invasive in vivo monitoring of specific molecular targets with the exciting prospect of translation to clinical application. While molecular imaging clearly dovetails with research into the fundamental molecular and cellular processes, concurrent efforts are needed into the development of novel imaging contrast agents that are specific for molecular processes. Furthermore, the imaging devices need to be tailored to optimize visualization and localization of specific molecular events. Ultimately, direct visualization of events fundamental to disease processes with molecular imaging will translate into better patient care through earlier and more specific detection and intervention.

References:

1. Weissleder R Fau - Mahmood U, Mahmood U. Molecular imaging. Radiology 2001; 219:316-33.
2. Beckmann N Fau - Falk R, Falk R Fau - Zurbrugg S, Zurbrugg S Fau - Dawson J, Dawson J Fau - Engelhardt P, Engelhardt P. Macrophage infiltration into the rat knee detected by MRI in a model of. Magn Reson Med 2003; 49:1047-55.
3. Beckers C, Ribbens C, Andre B, et al. Assessment of Disease Activity in Rheumatoid Arthritis with (18)F-FDG PET. J Nucl Med 2004; 45:956-964.
4. Chapman Pt Fau - Jamar F, Jamar F Fau - Keelan ET, Keelan Et Fau - Peters AM, Peters Am Fau - Haskard DO, Haskard DO. Use of a radiolabeled monoclonal antibody against E-selectin for imaging. Arthritis Rheum 1996; 39:1371-5.

5. Becker W Fau - Horneff G, Horneff G Fau - Emmrich F, Emmrich F Fau - Burmester G, Burmester G Fau - Kalden J, Kalden J Fau - Wolf F, Wolf F. Kinetics of 99mTc-labelled antibodies against CD4 (T-helper) lymphocytes. Nuklearmedizin 1992; 31:84-90.
6. Wang X Fau - Rosol M, Rosol M Fau - Ge S, Ge S Fau - Peterson D, et al. Dynamic tracking of human hematopoietic stem cell engraftment using in. Blood 2003; 102:3478-82. Epub 2003 Aug 28.
7. Mitsiades Cs Fau - Mitsiades NS, Mitsiades Ns Fau - Bronson RT, Bronson Rt Fau - Chauhan D, et al. Fluorescence imaging of multiple myeloma cells in a clinically relevant. Cancer Res 2003; 63:6689-96.
8. Ntziachristos V Fau - Bremer C, Bremer C Fau - Graves EE, Graves Ee Fau - Ripoll J, Ripoll J Fau - Weissleder R, Weissleder R. In vivo tomographic imaging of near-infrared fluorescent probes. Mol Imaging 2002; 1:82-8.
9. Choy G Fau - Choyke P, Choyke P Fau - Libutti SK, Libutti SK. Current advances in molecular imaging: noninvasive in vivo bioluminescent. Mol Imaging 2003; 2:303-12.
10. McCaffrey A Fau - Kay MA, Kay Ma Fau - Contag CH, Contag CH. Advancing molecular therapies through in vivo bioluminescent imaging. Mol Imaging 2003; 2:75-86.

Paediatric Knee

M.C. de Jonge (The Netherlands)

Room "Mozart" – Friday June 9th, 2006 – 15:30-15:50

Children and adolescents have the unique features of a growing skeleton and soft tissue which provides them with more resilience and resistance to noxious stimuli from the outside world compared to adults. If an injury is sustained their growing tissues react in a different way than adult tissues do. There are a number of conditions affecting the bone and soft tissues that are almost exclusively found in children. Apart from a spectrum of benign and malignant neoplasm's which are predominantly found in children there is also a number of benign other conditions that they are prone to. A number of these may however not be apparent during their growth to adulthood and can present later in life. It is especially then that the radiologist has to know these conditions and has to be aware that the abnormality he or she encounters is contracted in an earlier period of life and does not necessarily has to be the explanation for any complaints later. Furthermore the radiologist has to be familiar with the fact that the growing skeleton can have very variable and often confusing appearances on the different imaging modalities. Certain structures can have a pathologic appearance (e.g. increased signal intensity in the menisci) whilst in fact this could be a normal finding in the patient at a certain age.

Radiation hygiene is even more than in adults important. Non-ionizing radiation techniques like ultrasound and MRI should therefore be the first imaging modalities of choice. The implications of performing a MRI in a small child (which needs sedation or even anaesthesia) can be so large that if possible ultrasound should be favoured over MRI. A multidisciplinary approach to the patient is in this respect favourable or maybe even mandatory.

Osseous	Soft tissues
Osgood-Schlatter	Apexitis patellae
Blount disease	Discoid meniscus
Osteochondral lesions (OD)	Inflammatory (JIA)
Benign tumors - Osteochondroma	ACL / PCL / Menisci
Malignant tumors - Osteosarcoma	
Patellar dislocation	

The most common knee conditions we will see in children and adolescents are mentioned in the table above. As in adults the knee is also very vulnerable to sports related injuries due to the intrinsic instability of the joint. Also the patellofemoral joint is more unstable. These instabilities lead to common intra- and extra-articular knee injuries (as in adults) like ACL, MCL and menisci lesions and patellar dislocations. The most common conditions will be discussed as well as technical considerations and pitfalls.

Paediatric Osteo-Articular Imaging: Inflammatory and Infectious Musculoskeletal Diseases

S. Robben (The Netherlands)

Room "Mozart" – Friday June 9th, 2006 – 15:50-16:10

Diagnosis of musculoskeletal infectious and noninfectious inflammatory disease in children is difficult and challenging. The purpose of this paper is to emphasise the role of imaging in the diagnosis of various infectious diseases in childhood, including cellulitis, subcutaneous abscess, necrotizing fasciitis, pyomyositis, infectious bursitis and arthritis, osteomyelitis, foreign bodies, infectious lymphadenitis, as well as non-infecious inflammatory disease such as juvenile chronic arthritis. Especially infectious disease will be emphasized. Scintigaphy and cross sectional imaging techniques such as ultrasonography, CT and MRI have improved the ability to evaluate infectious and non-infectious inflammatory disease dramatically. Selection of the optimal techniques in each individual patient is essential and factors such as cost, radiation and need for sedation should all be considered.

Conventional radiography and ultrasonography are the initial maging modalities. Ultrasonography is an important initial modality for evaluation of musculoskeletal infections in children because it is rapid, non-ionising and very sensitive for (infectious) fluid collections and joint effusions. Moreover, the images are not degraded by metallic- or motion artefacts (as with CT and MRI) and finally, ultrasonography offers the possibility of fine needle aspiration to confirm the infectious nature of a fluid collection without unnecessary contamination of adjacent anatomical compartments. Ultrasonography should be combined with radiography because both imaging techniques are complimentary. Along with conventional radiography, ultrasonography is a very valuable modality for early diagnosis and follow up of musculoskeletal infections in children.

Scintigraphy (three-phase bone scan with Technetium 99m) has a high sensitivity for bone disease but a low specificty. Combining bone scintigraphy with gallium 67 and Indium 111 can improve diagnostic performance.

MRI and CT are not screening methods but are very useful in detailing osseous and soft tissue changes. CT allows a good definition of cortical bone changes and deep soft tissue abcesses that can not be seen with ultrasonography. MRI is superior in diagnosing soft tissue abnormalities, bone marrow changes, cartilage destruction and involvement of the growth plate by an infectious process. The major drawback of MRI is the need for sedation in children 6 years or less.

Trauma and Sport-related Injuries in Children

A.J. Grainger (United Kingdom)

Room "Mozart" – Friday June 9th, 2006 – 16:10-16:30

AIM
To highlight the differences existing between the mature and immature skeleton whih influence patterns of injury.

ABSTRACT
Fundamental skeletal differences exist between children, young adults and the mature adult. These differences result in altered patterns of injury despite similar mechanisms of damage.
Force to allow movement is transmitted from muscle to bone along the kinetic chain. In adults a common site for sport related injury is the myotendinous junction in the form of muscle tears. This is because this site represents the weakest point of the kinetic change. In the skeletally immature, growth plates are seen around joints and at apophyses (tendon bone junctions). These become the weak point of the kinetic chain and therefore represent a site of extreme susceptibility to injury.
As with sports injuries in adults two patterns of injury are seen: those resulting from an acute traumatic event, or those occurring as a result of chronic and repetitive strain. A large acute force will result in bone injury at its weakest point, the epiphyseal or apophyseal growth plate. Consequently fractures in this group of patients are usually either apophyseal avulsions or Salter-Harris type injuries. Repetitive strain occurs as a result of forces large enough to damage but not cause structural failure of a tissue. The force is then reapplied cyclically before complete healing occurs and may result in eventual structural failure. Generally these forces are either passive-compressive or active-distractive in nature.
Passive-compressive forces most frequently result in damage to osseous structures. This will frequently be the growth plate, but in the very young and in the skeleton nearing maturity the diaphysis of long bones is an important weak point prone to failure.
Joint injury can also be seen as a result of compressive (and/or rotational) forces and in the immature skeleton osteochondral injury is more common than internal and ligamentous disruptions. In the mature skeleton rotational "shearing" forces at a joint will often produce an isolated cartilage "flap" tear. However in the immature skeleton the subchondral bone is weaker than the overlying cartilage and shearing injury usually produces an osteochondral fragment rather than simply cartilaginous injury.
Active-distractive forces relate to contraction of a muscle tendon unit and as mentioned previously most frequently result in apophyseal injury in children. In the situation of chronic repetitive injury an apophysitis may result, such as is seen in Osgood-Schlatter disease at the distal patellar tendon insertion, and Sever's disease of the calcaneum. However even where apophyses don't exist traction injury at the tendon insertion can occur such as is seen at the lower pole of the patella in Sindig-Larsen disease. As the patient approaches skeletal maturity injuries to the myotendinous junction become more common as the apophyses fuse.
The osteochondroses represent a variety of conditions which may affect childrena and adolescents. Although they have a confusing nomenclature and their pathophysiology poorly understood, a common factor appears to be repetitive trauma.

Paediatric Bone and Soft Tissue Lesions

G. Allen (United Kingdom)

Room "Mozart" – Friday June 9th, 2006 – 16:30-16:50

This presentation will discuss the merits of different imaging techniques in the assessment of bone and soft tissue lesions. It will cover the common lesions such as osteochondromas, osteiod osteoma, Ewing's sarcoma, osteosarcoma and vascular soft tissue lesions. A sensible imaging algorithmn will be discussed for the management of bone and soft tissue lesions from the initial diagnosis and staging.

Langerhans Cell Histiocytosis: Imaging Findings

R. Arkun (Turkey)

Room "Mozart" – Friday June 9th, 2006 – 16:50-17:10

Langerhans cell histiocytosis(LCH) describes a group of syndromes that share the common pathologic feature of infiltration of involved tissues by Langerhans cells. Typically, the skeletal system is involved, with characteristic lytic bone lesion form that occurs in young children or a more acute disseminated form that occurs in infants. Langerhans cell histiocytosis(LCH), formerly known as Histiocytosis X, is an idiopatic non neoplastic proliferation of histiocytes that may have a localized or systemic clinical manifestation. The cause of LCH is unknown.

LCH may involve any bone, however the prefered sites are the skull, mandible, spine and long bones. Long-bone involvement, especially of the femur and tibia, is more frequently seen in children. In long bones, lesions usually arise in the diaphysis or metaphysis. Osteolytic lesion which has poorly defined margins is seen with endosteal scalloping and cortical thinning in early phase of disease. With the progression of disease, lesion's margins became sharply defined or with sclerotic margins. The amount of associated lamellated or solid periosteal reaction is variable. Differential diagnosis includes osteomyelitis, Ewing's sarcoma, leukemia and lymphoma. Spine involvement is not common for LCH. It usually seen in thorasic vertebrae and results in vertebral collapse named in vertebrae plana with preservation of disc space.

MRI is superior for depicting extend of the lesion, evaluating marrow edema and assesing soft tissue extend. High signal on T2-weighted images is seen within the lesion, bone marrow and periosteum. Lesions are isointense to muscle on T1-weighted images with ill defined margins. Soft tissue mass is seen in 30% of cases.

LCH has benign histological findings but also has aggressive clinical and radiological course. MRI due to its sensitivity may lead to an overestimation of the lesions aggresiveness and plain radiography should always be the first imaging technique to make correct diagnosis.

Appendicular Skeleton - Lower Limb Trauma in Sports

C. Faletti (Italy)

Room "Mozart" – Saturday June 10th, 2006 – 08:30-08:50

Although the extent of the biomechanical forces differs, all of the lower limbs are involved when carrying out sports activities.
Therefore, when dealing with traumatic lesions, the distinction between an acute lesion and a chronic one is a must.
The lower limb muscular structures may be involved at various levels, in particular those of the abductors, quadriceps, flexors, for the thigh and flexors for the leg, both at an insertional and musculo-tendineous junction level.
The US and MR are the most sensitive and specific examinations for these pathologies, as they are able to evaluate not only the site, but also the entity of the lesion, both in the acute phase and follow-up.
If the lesion is at the insertional level, then the plain X-Ray may be useful to evaluate the presence of any bone detachments or metaplastic ossification of the lesion. .
The CT scan is rarely of use and limited in its capacity to aid in the study of such calcified alterations and their relationships with the surrounding structures.
Involvement of the coxo-femoral joint is a rare finding in sports pathology.
Acute traumatic sports injuries do not differ from those of common trauma and are more frequently found in sports that involve high speeds, such as cycling and alpine down hill skiing.
Overuse lesions may involve the joint components with fractures like that of the acetabular margin or may manifest themselves as osteochondral alterations of one of the two superficial joints.
In this case the first choice diagnostic examination is that of the X-Ray followed by the CT scan if the lesion is traumatic or by the MR/ arthroMR should there be cartilage or osteochondral pathologies.
In some sports activities where situations involving high stress levels may arise, particular alterations of functional overloading on the femoral bone profile may be observed.
The knee is surely the joint subjected to the most stress during sports activists and traumatic lesions in this site are frequent and of various entity
The first choice examination is surely the plain X-Ray, which at times is to be completed with a CT scan in traumatic bone lesions with a positive X-Ray result.
In the case of a negative X-Ray response, further investigation may be carried out by MRI, which, thanks to its high sensitivity and specificity allows for the formulation of extremely detailed diagnosis, at times paramount in professional athletes from a prognostic point of view.
The MR, in combination with the US, is also indicated in the study of overuse traumatic lesions of both the patellar tendon and the quadriceps tendon.
The ankle is no less under stress in sports activities and is frequently affected by traumas in numerous specialities.
Here the X-Ray plays an important role, making it possible not only to evidence any acute traumatic bone lesions but also investigation into the source of pain and/or functional impairment.
The MR is once again the examination of choice for traumatic ligament lesions, as it is able not only to show the entity and site of the lesion but also any associated cartilage/bone alterations, taking on a therapeutic treatment role.
When the MR is combined with the US, a complete picture of the muscular and tendon pathologies is obtained, offering assessment of both grade and involvement.
However the MR is fundamental when faced with a skeletal pathology that gives a negative X-Ray result such as in the cse of a stress response in fatigue fractures, a common pathology in some sports activities.
In conclusion, in traumatic pathology of the lower limbs, diagnostic imaging plays a fundamental role in demonstrating and pin-pointing both musculo-tendon and osteo-articular lesions, allowing for amore precise diagnosis and, therefore a correct therapeutic choice.
The radiologist must, however, evaluate the images, bearing in mind the specific sports and has to "interpret the lesion" on the basis of the activity itself from all its various facets.

Appendicular Skeleton - Upper Limb Trauma in Sports

M. Padron (Spain)

Room "Mozart" – Saturday June 10th, 2006 – 08:50-09:10

Plain radiography is still the first and often the only imaging modality needed for evaluation of trauma.The majority of peripheral trauma is well shown on the plain radiograph provided that a good sistematic approach is adopted.Ultrasound provides an excellent tool for assessing ligamentous,muscle and tendinous injuries in acute sport trauma.High resolution ultrasound using high frequency linear probes also bring some interest in the assessment of acute fractures in the scaphoid.MDCT has improved the ability to image patients with skeletal trauma.Advantages of this technology include the extremely rapid scan times,the ability to produce high quality multiplanar reformations and ability to reprocess raw data easily and quickly.MRI has its major impact on diagnosing traumatic joint injury.The evaluation of hyaline cartilage,subchondral and trabecular bone are at the moment domain of MRI.Other advantages of MRI includes the possibility of detect occult fractures and the diagnosis of stress and inssufficiency fractures.

MR Imaging of Shoulder Trauma - Rotator Cuff

L. Steinbach (USA)

Room "Mozart" – Saturday June 10th, 2006 – 09:10-09:30

This lecture focuses on newer concepts associated with MR imaging of rotator cuff disease. These include internal and external impingement syndromes. One form of internal impingement is in the anterior superior glenohumeral region, near and including the rotator interval, bicipital sling, and supraspinatus and subscapularis tendons. The coracoid can also produce external impingement upon the subscapularis tendon resulting in tear with frequent biceps subluxation and dislocation. Excessive abduction and external rotation can produce internal impingement between the greater tuberosity, posterior superior glenoid and supraspinatus and infraspinatus tendons leading to posterosuperior impingement. Partial articular surface tears of the tendons are associated with these impingement syndromes. Laminar partial thickness tears result in retraction of portions of the tendon. Some laminar and full thickness tears form intramuscular cysts.

Anterosuperior impingement (ASI) is a newly described form of internal shoulder impingement that is responsible for anterior shoulder pain in middle-aged patients. It is the result of an impingement of the long head of the biceps and the subscapularis tendon with the anterosuperior glenoid rim. It occurs in the region of the biceps pulley and the subscapularis tendon. The biceps pulley is a tendoligamentous sling in the rotator interval composed of the coracohumeral ligament, the superior glenohumeral ligament, supraspinatus tendon and subscapularis tendon. A lesion of the pulley system can be the result of degeneration or trauma. Traumatic causes include a fall on the outstretched arm with rotation of the arm or a fall backward on the hand or elbow. In addition, repetitive forceful internal rotation above the horizontal plane or an abrupt termination of an overhead throw can create this form of impingement. A pulley lesion leads to instabiity of the long head of the biceps tendon, resulting in passive anterior translation and upward shift of the humeral head, resulting in ASI. MRI findings of ASI include tears of different combinations of the subscapularis and supraspinatus tendons, the SGHL and CH ligaments as well as the rotator interval capsule. The biceps tendon may have tendinosis or partial tears. It can be displaced, subluxed or dislocated.

Subcoracoid impingement occurs when the coracoid-lesser tuberosity distance narrows, encroaching upon the subscapularis tendon in the vicinity of it's attachment to the lesser tuberosity. Symptoms are produced with the humeral head in adduction, forward flexion and internal rotation which reduces the distance between the coracoid and humerus. Narrowing of this distance can be caused by congenital hypertrophy or elongation of the coracoid or acquired conditions including coracoid or lesser tuberosity fractures, glenoid osteotomy, and coracoid process transfer during surgery. This form of impingement results in tensile undersurface fiber failure (TUFF) of the subscapularis tendon along with occasional biceps tendon subluxation and dislocation. The coracohumeral interval distance as measured on MRI is a poor predictor of subcoracoid impingement. Findings tend to overlap with ASI and both of these forms of impingement may be a spectrum of a similar process.

Posterosuperior impingement of the glenoid rim can produce shoulder pain and can lead to partial thickness tears of the undersurface of the rotator cuff. This form of internal impingement was first described in overhead athletes; it has also been recognized in nonathletes who frequently rotate the shoulder into the extremes of abduction and external rotation. The mechanism that leads to this form of impingement involves superior or posterosuperior angulation of the humerus with respect to the glenoid. In this syndrome, the articular side of the rotator cuff tendons and the greater tuberosity are compressed against the posterosuperior glenoid labrum, resulting in partial thickness tendon tears, especially of the posteroinferior supraspinatus and the infraspinatus, a degenerative tear of the posterior surface of the posterior superior labrum or underlying glenoid, and an osteochondral compression fracture in the region of the greater tuberosity of the humeral head (which can simulate a Hill-Sachs lesion). The inferior glenohumeral ligament and adjacent labrum can also be injured. The tears can be well seen on MR arthrograms obtained in the ABER position. Treatment has mixed results and is aimed at controlling extremes of shoulder elevation and abduction external rotation by exercise or surgery and at repair of the injured structures.

More recently there has been some question as to the association of partial undersurface tears of the rotator cuff and superior labral lesions with internal impingement. One study found that these "kissing lesions" were not associated with major sports activity. Therefore, it should not always be assumed that an undersurface rotator cuff and posterosuperior labral tear that are seen in the same patient are caused by abduction and external rotation.

These syndromes are frequently associated with partial thickness tears along the articular surface of the rotator cuff tendons. Tears at the articular surface are the most common type of partial thickness tears and they are well seen with MR arthrography.

Partial and full thickness tears can propagate within the tendon extend in the longitudinal plane of the tendon fibers. These are termed "laminar" tears. There may be varying degrees of retraction of the different portions of the tendon in a laminar tear. An intramuscular "sentinal" cyst may form in sheath or substance of the rotator cuff muscles when fluid from the joint propagates along a partial or full-thickness tear into the musculotendinous junction. These cysts are strongly associated with rotator cuff tears and present as a high signal intensity mass on T2-weighting and STIR images with rim enhancement following intravenous gadolinium injection. When seen on MRI, intramuscular rotator cuff cysts suggest that there a high likelihood of an underlying rotator cuff tendon tear. The cysts are more commonly seen in association with partial thickness tears, comprising half of the tears in one study. It is interesting that in some cases the cyst can propagate from one torn tendon (ie. the supraspinatus) into an adjacent rotator cuff muscle (ie. the infraspinatus) with an intact tendon. This is related to interdigitation of tendons as they insert on the humerus.

Cost-Effective Imaging of the Knee

A. Van Erkel (The Netherlands)

Room "Mozart" – Saturday June 10th, 2006 – 09:30-09:50

Knee pathology is very common. In The Netherlands (population 15 million) about 300.000 knee injuries occur annually, resulting in 90.000 referrals and 20.000 arthroscopies. Because in a common radiological practice the knee is the most commonly investigated joint with MRI, we need a good level of expertise, but we also need to get the indication right. We need to know why, who an when to image the injured knee.

In most cases patients present with non-specific symptoms: pain, intermittent locking, giving-way and/or swelling and additional imaging is needed to make a therapeutic decision between arthroscopic or conservative treatment. As a diagnostic tool arthroscopy is costly and invasive. MRI is a cost-effective tool to safely make this therapeutic decision in high-risk patients. High-risk patients are patients with any of the following at physical examination: significant joint effusion, extension deficit/flexion deficit, instability, one positive meniscal provocation test, or muscle atrophy. Based on history and physical examination it is not possible to select a group of patients in which direct arthroscopy is more CE. Of all relevant clinical parameters, age and sex are the strongest predictors of pathology. In men over 30 years old direct arthroscopy is more cost-effective, but cost differences are minimal.

Low risk patients present to the orthopedic surgeon with knee symptoms, but lack the abnormal findings on physical examination. Surprisingly, when MRI is performed in these patients, still 27% show arthroscopically treatable pathology with only a small fraction of false positive results. In this group of patients it is not possible to find discriminatory factors to determine who will benefit from MRI.

For the timing of the MRI, the general consensus is not to image within the first four weeks of trauma. Pain, swelling and guarding results in a reduced accuracy of physical examination. Moreover, in a significant proportion of patients, symptoms have subsided after four weeks and no further imaging or treatment is needed. Earlier MRI would therefore result in unnecessary costs.

MRI is a cost-effective imaging tool to select patients with knee symptoms for arthroscopy. All patients that present with pain, intermittent locking, giving-way and/or swelling and are high-risk based on physical examination need to be imaged with MRI at least four weeks after the initial trauma. In patients that are low-risk, a significant proportion will benefit from imaging and arthroscopy, but it is not possible to identify this group of patients based on clinical parameters. It is suggested to perform MRI in these patients when symptoms persist for more than six months.

Fractures and Malalignment - Pre- and Postoperative - What does the Surgeon expect from the Radiologist

H.P. Delport (Belgium)

Room "Mozart" – Saturday June 10th, 2006 – 10:30-10:50

Why do we need Imaging Techniques in Orthopaedics and Traumatology ?
What does the Surgeon expect from the Radiologist ?

I.First of all for diagnostic reasons.
As surgeons we have to use conventional X-ray, Ct and MRI imaging.
1.For fracture detection, to be sure not to mis a fracture.
2.To visualize difficult fractures especially intra-articular fractures.
3.To analyse the deformations, impaction and comminution.
4.To classify the fracture.

II.All these findings provide a basis for specific treatment or surgical management. This enables us to do a pre-operative planning.
Therefore we need :
1.Overview X-ray.
2.Contra-lateral x-ray.
3.Methods for measuring.
4. Methods to template.

Reduction is one of the key procedures in orthopedic trauma surgery and has been acknowledged as one of the conditions for a good outcome in intraarticular an extra-articular fractures. The information available to the surgeon during the reduction maneuver can be divided into visual and tactile information. The optimal implementation of these parameters, combined with the surgeon's individual experience, will significantly affect the results of the operation. Anatomical regions where a limited direct view through the approach is supported by intraoperative imaging are intra-articular fractures of the elbow, forearm, acetabulum, proximal tibia, pilon, and hindfoot, and extra-articular fractures of the spine, pelvis, femur, and tibial shaft. Surgery in these regions is demanding since the approaches limit the visual control of the axes and also the anatomical reduction within the joint. Computer aided orthopedic surgery (CAOS) was introduced to increase the accuracy of selected procedures in orthopedic surgery.Exact preoperative management is necessary to make possible an anatomical reconstruction.

III.Post-operatively the orthopaedic trauma surgeon wants to analyse by exact visualization the result of the internal fixation and monitor the healing process.

This means :
1.Good post-op x-rays showing the hardware fixation but also the co-aptation of the fragments.
2.Detailed x-rays of the fracture site without disturbance of the metal devices.

IV.Conclusion :
Improved diagnostic imaging with CT is very helpful for fracture classification and planning surgical treatment. In my opinion postoperative quality control is done best with computed tomography.

Imaging of Postoperative Ligaments

J. Kramer (Austria)

Room "Mozart" – Saturday June 10th, 2006 – 10:50-11:10

Nowadays, MR imaging is the method of choice for the evaluation of lesions of the knee joint. It enables noninvasively an accurate assessment of the intraarticular structures and supports the clinicians with important information for the therapeutic management.Treatment options for knee injuries are generally considered in conjunction with severity of injury, clinical symptoms, age, proposed level of activity and association with other structural damage of the joint. MR imaging plays also a very important role in the evaluation of patients with recurrent or residual symptoms postoperatively, by documenting findings of surgical complications, reinjury, or other sources of complaints unrelated or indirectly related to the prior operation. However, accurate MR imaging assessment of the postoperative knee requires an understanding of the common surgical procedures performed, their normal postoperative imaging appearance as well as the MR features of potential procedural complications.

The anterior cruciate ligament (ACL) is a key stabilizer of the knee joint. This ligament is by far the most frequently completely torn ligament of the knee. Treatment and reconstruction techniques of ligamentous injuries of the knee have improved significantly over the last years. Treatment of ACL injury is typically tailored to the patient`s lifestyle, age, and the presence or absence of other associated injuries of the joint. In older patients conservative treatment may be an option with physiotherapy and muscle training and thus avoid or delay the early onset of arthritis. In people used to sporting activities operative treatment is advocated. ACL reconstruction, in the long term, leads to restoration of functional stability and relief of symptoms. Several techniques of ACL reconstruction have been described. The patellar tendon autograft is the method used mostly, however, Hamstring grafts are used more and more frequently. Unfortunately, not rarely unsatisfactory results in terms of continued instability, loss of extension, and knee pain can be observed in patients after ACL reconstruction. Besides a full retear of the ACL the most important complication evaluated by MR imaging is graft impingement. In this setting a fibrotic nodule ("cyclops lesion") becomes entrapped between the femur and tibia when the knee is extended and leads to a mechanical block of full extension.

Injuries to the posterior cruciate ligament (PCL) are less frequent than those to the ACL. They require greater force, and they initially may be unrecognized, leading to a delay in diagnosis. Therefore, PCL reconstructions are rare procedures and thus evaluated with MR imaging only occasionally. Currently, nonoperative management is advocated only for those patients with asymptomatic isolated PCL injuries. The same graft options that are available for anterior cruciate ligament reconstruction are also available for PCL reconstruction.

The clinical importance of MR imaging following to surgery lies in the evaluation of patients suffering from persistent or recurrent knee pain with an uncharacteristic clinical appearance and in the fact that a very detailed assessment can be made for therapy planning. Furthermore, MR imaging can provide surgeons with answers to specific questions concerning the conservative therapy or especailally in cases a re-operation has to be performed.

Knee and Hip Prosthesis - What does the Surgeon expect from the Radiologist

R. Geesink (The Netherlands)

Room "Mozart" – Saturday June 10th, 2006 – 10:50-11:10

In the area of hip and knee implant surgery, the use of radiology has more aspects than just helping establish the right diagnosis. The diagnosis of degenerative changes is not so difficult although there often is a discrepancy between clinical symptoms and the radiological stage of the disease. In addition, the radiograph is for the orthopaedic surgeon important as a planning tool for surgery, like the drawing of a house for an architect, as well as a tool to evaluate prosthetic problems after surgery. This brings many biomechanic aspects into the equation. In adequate reconstruction from a biomechanical perspective may jeopardise the result of the arthroplasty. For the hip this may include centre of rotation of the hip, offset of the femoral shaft axis from the hip centre, cup and stem position relative to the original acetabulum and femoral canal and their alignment. Inadequate reconstruction of the offset may result in postoperative dislocation because of soft tissue laxity. Non-anatomic placement of the prosthesis usually shortens its survival life and causes other problems such as dislocation. For the knee prosthesis, alignment of the implant to the loading axis of the leg is very important. Oblique loading increases the wear of the implant components and thereby shortens its life-time. Also with the knee, implant placement relative to the anatomy is critical. Too much anterior placement of the femoral canal results in so-called notching, that predisposes to postoperative fracture. Off-centre positioning of the tibial component may cause ligamentous instability as the remaining posterior cruciate ligament does not operate in its physiological range. Patellar component mal-alignment also causes frequent problems with patellar tracking over the femoral component and may dislocate. Computer-navigation is more and more used to help the surgeon obtain the exact desired position of components although the techniques involved are still in an experimental phase.

Post-operatively, depending on the type of fixation of components, radiological changes verify ingrowth of the components in the case of cementless devices. This usually becomes visible between three and six months after surgery. After an interval of two years or longer, remodelling of the bone may become visible caused by the altered biomechanical conditions in the bone. Usually this is more predominant with cementless devices than with cemented ones and also more around the hip than the knee.

In the analysis of postoperative prosthetic problems, we not only have to look for signs of implant loosening or infection but also analyse the biomechanical situation for similar parameters as discussed with preoperative planning. As loosening becomes more rare with modern types implants, problems tend to shift towards those of instability, malalignment or non-physiological functioning of the devices. In a significant number of cases they are caused by inadequate reconstruction of the joint from a biomechanical perspective.

Imaging of the Failing Hip Prosthesis

Ph. O'Connor (United Kingdom)

Room "Mozart" – Saturday June 10th, 2006 – 11:30-11:50

Total hip arthroplasty is the treatment of choice for end stage symptomatic hip arthropathy. Hip replacement surgery has become widespread since its introduction in the 1960's with proven therapeutic benefit. Prostheses however fail given sufficient patient longevity, this occurs either by mechanical failure, infection or as a result of flaws in surgical technique or prosthesis manufacture. These mechanisms of failure are well described with the commonest modes of failure related to infection, prosthetic or periprosthetic fracture and wear debris disease. Improvements in theatre design and antibiotic cover have reduced the incidence of infection. Developments in prosthesis manufacture have decreased the incidence of prosthetic and periprosthetic fractures. The decrease in these modes of failure combined with generally increased population life expectancy result in wear debris disease becoming increasingly prevalent. The classical description of wear debris disease is that of osteolysis occurring at the cement-bone or prosthesis-bone interface of a joint replacement. This results from an inflammatory reaction which occurs in response to polyethylene particles. This particulate matter arises within the joint from wear between the acetabular and femoral components.

This lecture presents the pathophysiological mechanisms underlying the radiological patterns of failure seen to give the radiologist a clearer understanding of imaging findings.

The Post-surgical Spine
Imaging Evaluation Following Spinal Instrumentation and Interbody Fusion

J.W.M. Van Goethem, L. van den Hauwe, P.M. Parizel (Belgium)

Room "Mozart" – Saturday June 10th, 2006 – 11:50-12:10

1. Imaging Technique

Imaging techniques of the instrumented postoperative spine can generally be divided into 2 categories, depending on whether they assess either functional or structural integrity. Furthermore, the choice of modality is influenced by the type of instrumentation or material, if any, that was used.
In the routine evaluation of the instrumented postoperative spine, assessment of structural integrity is mainly performed by static examinations (plain film, CT and MRI). If the purpose is to demonstrate the presence or absence of (abnormal) motion between vertebral segments after spinal fusion, functional integrity is evaluated using any type of dynamic examination (flexion-extension, lateral bending, …). However, these studies depend heavily on patient co-operation and may fail to show abnormal motion because of muscle guarding, spasm or internal fixation.
Accurate radiographic documentation of the proper placement of cages, plates, and/or screws following spine surgery is very important. Plain film is usually sufficient to confirm correct positioning of metal implants but CT is more accurate especially in determining pedicle screw positioning. Carbon and titanium cages can be accurately imaged both with CT and MRI, while tantalum cages can only be imaged accurately with MRI.
Stainless steel causes important artifacts both on MRI and CT, and frequently makes image interpretation of the operated site problematical. Metallic implants used for spinal fusion are however not a contraindication to MRI. Superparamagnetic materials such as steel, however, create severe magnetic-susceptibility artefacts. Increased bandwidth and shorter echo time (TE) may lessen these. In general, (F)SE sequences have less magnetic susceptibility than gradient-echo acquisitions. Metals which are not superparamagnetic, such as titanium or tantalum, produce primarily radiofrequency artefacts, which are less marked.

2. Fusion versus Pseudarthrosis

Determining the solidity of a fusion is a difficult problem. Routine re-exploration for the purposes of determining the status of a surgical fusion is impractical because of the expense and morbidity involved. Therefore, it is important to find an imaging technique that will reliably assess the status of an intersegmental fusion.
The value of obtaining serial conventional radiographs of the spine in the post-fusion patient is unclear, with several studies delivering conflicting results. Furthermore, the referring clinician is sometimes faced with the puzzling contradiction that in a patient who is doing well clinically, the radiologic examinations do not show evidence of bony intersegmental fusion. The reason for this apparent contradiction is believed to be that premineralized osteoid may be functionally fused, but may nevertheless appear radiolucent on conventional radiographs. The calcification of osteoid typically takes many months to complete. Therefore, as a general rule, it is accepted that at least 6 to 9 months from the time of surgery are necessary for the development of solid intersegmental fusion to be seen radiographically.
After mineralization of the osteoid, the bone in the fusion area may appear radiographically denser than the adjacent otherwise normal vertebral bone. As mature bony trabeculae develop, they bridge the fusion area between the respective native bony structures. This leads to visual obliteration of the cortical vertebral endplates, and thus to a loss of the so-called 'graft-host' interface between the implant bone and the native vertebral bone. In some instances, a dense line of sclerotic bone may be an indicator of fusion between the graft material and the host vertebra.
CT imaging to confirm fusion can be more accurate in cases where artifacts due to implants are minimal. In these cases CT is actually more sensitive in detecting bony bridging that can even be seen through hollow implanted cages. On the other hand, a lucency seen around cages, screws or any other implants on late postoperative CT imaging (>1 year postoperative) is suggestive for loosening.

MRI seems very promising in evaluating secondary changes due to segmental motion after fusion sometimes resulting in (persisting or new) Modic type I changes in the bone marrow of the adjacent vertebral bodies . Conversely, solid fusion sometimes leads to conversion of previous Modic type I changes to fatty Modic type II changes confirming immobilization of the fused segment. Persistent or new Modic type I changes in patients >6 months after surgery are a sign of abnormal stress, possibly due to abnormal motion and pseudarthrosis.

3. Adjacent Level Degeneration

New or accelerated degeneration of discs adjacent to a fused level is mostly seen in the cervical spine. The anatomy of the cervical spine is unique in many ways, which may explain differences in the development of adjacent level problems as opposed to the lumbar region. Moreover anterior cervical discectomy with fusion is the accepted surgery for cervical disc herniation, while fusion is not always performed in the lumbar spine. Posterior cervical discectomy, which can preserve mobility at the affected level, has been considered technically challenging and risky, especially for central or paramedian disc herniation. It is believed that eliminating motion through fusion shifts the load to the adjacent levels, causing earlier disc degeneration . Significant increases in intradiscal pressure and segmental motion occur at levels adjacent to fusion during normal range of motion. This may partially explain the mechanism of early disc degeneration at levels adjacent to cervical spine fusion.

4. Artificial Discs

Although spine fusion is a versatile and effective technique in the treatment of spinal disorders, increased stresses on adjacent unfused levels may lead to symptomatic adjacent level degeneration as described earlier. The goal of non-fusion devices in spine surgery is to ablate or unload painful structures while preserving segmental motion. Most of the artificial disc procedures are performed in the cervical spine. Several artificial discs are nowadays available and have promising results, such as significant pain improvement and functional spinal motion at the level of surgery.
Imaging after artificial disc placement is indicated either to confirm correct placement and preserved level motion or to diagnose surgical complications and/or recurrent pain. For the evaluation of artificial disc position and motion plain films with flexion and extension are usually sufficient. For all other indications MRI is the preferred imaging modality.

Future ESSR Meetings

Izmir / Turkey	**June 1-2, 2007**
Galway / Ireland	**June 2008**
Heraklion / Greece	**June 2009**

ESSR
founded 1993

For more information about ESSR membership and the upcoming meetings, please consult the ESSR website at

http://www.essr.org

Abstracts

Industry Meets Science

–

Room “Beethoven” and Room “Mozart”
Level 1

Aperitif and appetizers will be served during the Industry Meets Science sessions.

The lunch will be served after the sessions, in the Technical Exhibition area (room “De Grote Witte Roos”, level 2)

The Future of Computed Tomography

W. Jacobs (Belgium)

Room "Beethoven" – Friday June 9th, 2006 – 12:00-12:30

Over the last decade Computed Radiography (CR) has proven to be a viable and mature solution for projection radiography examinations with the basic advantage of compatibility to existing equipment, opening the gateway to PACS and other advantages of digital imaging, and this in a cost effective way.
But how does CR compare to Screen/Film and to Direct Digital Radiography (DR) in terms of performance? Which applications are covered and what are the limitations of each technology? What are the most recent developments in CR technology and image processing?
An overview of the different technologies used in CR and DR provides more insight in the capabilities of each technology in terms of speed and image quality.
The basic CR imaging cycle has three steps (exposure, read out and erasure) and the performance in terms of workflow and image quality is to a large extent depending on the technology used for the image plate and the scanner.
Detective quantum efficiency, which is the most objective physical parameter to express image quality shows that "needle crystalline phosphor technology" does close the gap between CR and DR.
Image processing plays a crucial role in the imaging chain. Software that renders optimal display of the image information is an essential part of the digital system. It is widely accepted that multi scale image processing is superior to all other methods currently used. The performance of multi scale image processing can easily be demonstrated with technical and clinical images.

Guerbet

A. Blum, R. Detreille, J.P. Zabel, B. Sauer, T. Batch (France)

Room "Mozart" – Friday June 9th, 2006 – 12:00-12:30

The recent approval by the French Ministry of Health of the use of intra-articular Gadolinium could promote the increasing use of MR-arthrography in France. Although useful in specific pathologies, it should not be overly prescribed and should be considered only if it provides a more accurate diagnosis than other less invasive techniques. The technical aspects and medico-legal implications of MR-arthrography as well as its various indications are reviewed in this presentation. There are three possible techniques: indirect MR-arthrography with IV Gadolinium injection, direct MR-arthrography with intra-articular Gadolinium injection and lastly, direct MR-arthrography with intra-articular injection of iodinated contrast media (or saline solution). Indirect MR-arthrography cannot be recommended in routine because of insufficient contrast enhancement and the absence of joint filling. Conversely, direct MR-arthrography allows joint expansion which smooths out capsule and ligaments, better delineates articular surfaces and yields a homogeneous high intensity signal of the entire joint. Direct MRarthrography with iodinated contrast media combines standard arthrography with conventional MRI. Direct MR-arthrography with intra-articular injection of dilute Gadolinium is associated with T1 w.i., usually of higher quality than T2W w.i., even though the latter remains part of the protocol. Although, the last two techniques yield higher image quality and are often performed for various articular pathologies, they should not be randomly carried out in the evaluation of joint pathology. However, they should be recommended as the first step in the diagnosis of painful shoulders or hips in young adults and athletes.

Contrast enhanced gray-scale sonography in assessment of joint vascularity in rheumatoid arthritis.

A. Klauser (Austria)

Room "Beethoven" – Saturday June 10th, 2006 – 12:20-12:50

Rheumatoid arthritis (RA) is a chronic systemic disease of unknown origin, characterized by articular inflammation and destruction, and leading to substantial disability and morbidity. The prevalence is between 0.5 and 1% of the population. Ultrasound (US) has been reported as a useful tool in the assessment of joints in patients with RA. Color/Power Doppler (CD) US has proved to be valuable in the detection of vascularity in synovial proliferations to improve assessment of disease activity. Several studies found weak correlation between imaging findings and clinical indices of disease activity or pathohistological number of vessels, because the performance of Doppler techniques in the detection of slow flow and flow in small vessels, such as those that are formed in angiogenesis, is still poor. Angiogenesis is a basic principle of inflammatory disease and refers to the growth of new capillary blood vessels.
Contrast enhanced (CE) US improves the detection of inflammatory vascularity, by maximizing contrast and spatial resolution. The capacity of CEUS to detect vascularity in joints was compared to that of gray-scale US and PDUS by the International Arthritis Contrast Ultrasound (IACUS) study group in a multicentre trial of 5 European centers comprising 113 consecutive adult patients of both genders with clinically diagnosed RA. A total of 113 joints were examined. The endpoints were the number of joints with active and inactive synovitis, and the measurement of synovial thickness. CEUS achieved substantially better differentiation between active and inactive synovitis (97.3% of joints) compared to US and PDUS (60.1% of joints). The measurement of overall thickness related to active synovia was significantly improved after the administration of contrast medium.

CEUS enables not only for a sensitive assessment of articular synovitis, but also for characterization of peritendinous synovitis, which is of high clinical relevance, because in the course of the disease tendon rupture can result, representing further steps towards mutilation. CEUS can improve detection of pathologic intra- and peritendinous vascularity associated with aggressive tenosynovitis. However, US contrast media is not yet included in routinely assessment of RA, even CEUS shows promising results in diagnosis and follow up of RA.
The current role of US contrast in RA is based on the capability to enlighten the underlying pathophysiologic processes of increased vascularity at the microvascular level at preferred sites and this is of increased interest because new treatment regimes target the microvascular level. The future role lies in the potential of US contrast media to add for new defined sensitive disease activity grading and therefore it might allow establishing prognosis.
In summary, US is of great importance for articular and periarticular imaging in different regions of RA patients. One of the key issues in the management of RA is to detect early manifestations of RA before destructive changes at bones or alteration of tendons and ligaments occur. Thus, US should be used as first-line imaging modality in suspected early cases of RA and CEUS can further enable for sensitive assessment of vascularity which correlates with disease activity. This technique adds important information not only for early detection but also for follow up.

Assessment of bone disease and response to ERT in type1 Gaucher disease: The Dutch experience and an overview of the literature

M. Maas, C.E. Hollak, E.M. Akkerman, J.M. Aerts (Netherlands)

Room "Mozart" – Saturday June 10th, 2006 – 12:20-12:50

Introduction: Gaucher disease is the most common of a group of rare genetic conditions known as the lysosomal storage disorders and results from mutations in the gene encoding the lysosomal enzyme glucocerebrosidase. Deficiency in glucocerebrosidase, first recognised in Gaucher disease in 1965 leads to the accumulation of the glycolipid glucocerebroside principally within the lysosomes of tissue macrophages. These lipid engorged cells, known as Gaucher cells infiltrate the spleen, liver, bone marrow, and other organs to cause debilitating and clinically heterogeneous disease. Patients may present with several clinical manifestations, such as an enlarged spleen and associated anaemia or thrombocytopenia, an enlarged liver with possible evidence of hepatic dysfunction or portal hypertension, and skeletal disease with associated bone pain, bone deformation and / or pathological fractures.
Bone disease is a common and often painful and disabling manifestation of Gaucher disease. Clinical signs that can be seen in skeletal involvement are atypical bone pain, bone crisis, bone infarcts and avascular necrosis. Enzyme replacement therapy (ERT) with imiglucerase has become the standard of care for the treatment of patients with type 1 Gaucher disease. More recently, a treatment approach known as substrate reduction therapy (miglustat) has become available. These therapies are very expensive: the annual costs in the Netherlands are between 50.000 and 200.000 euros per patient. Evaluating bone disease is a very important part of monitoring patients with Gaucher disease, since the complications mentioned are irreversible and have a significant impact on quality of life.
Furthermore, since the degree of haematological problems, pancytopenia, or organomegaly do not always correlate with the extend of bone disease we should separately assess this compartment.

Radiology: In evaluating response to therapy it is important to assess each compartment thoroughly.
All Gaucher patients should receive a comprehensive initial radiologic evaluation for bone disease and regular, ongoing radiologic monitoring, at least once every one to two years. Active bone disease may require more frequent monitoring. If possible, plain radiographs (X-rays) should not be routinely used as the sole method in assessing bone disease in Gaucher patients. Plain radiography is less sensitive in detecting and monitoring Gaucher bone disease than MRI. MRI is the best technique for assessing skeletal involvement in Gaucher disease, both qualitative and quantitative. In Gaucher disease infiltrated bone marrow shows low signal intensity both on T1 and T2 weighted images. There is a centrifugal spread of disease, when there is progression of infiltration. The axial bone marrow almost always is affected, were in the peripheral skeleton the diaphysis is affected, whereas the epiphysis and apophysis of the long bones remain relatively unaffected, except for the most severe cases. A practical qualitative approach for assessing bone disease is to evaluate axial bone marrow (lumbar spine) with Sagittal T1 and T2 weighted sequences and periferal marrow (femurs including hip and knee) with coronal T1 and T2 weighted sequences.In this way a qualitative analysis is feasible.

However, to evaluate the effect of treatment, it is mandatory to provide quantitative measurements, in order to accurately tailor this expensive therapy. Quantitative Chemical Shift Imaging (QCSI) is an MRI technique, that provides a sensitive measure of fat fraction, which can be used to quantify Gaucher cell infiltration in the bone marrow. Measures correlate with clinical bone complications and the technique is able to detect early changes in fat fraction as response to therapy. Since QCSI is not a standardized technique on MR scanners, various alternatives are explored. There are a number of semi-quantitative MRI scoring methods. Of these, the bone marrow burden (BMB) score is a relatively new method that is considered a promising technique for monitoring Gaucher disease. This method takes into account the progressive patterns of bone marrow infiltration in the lumbar spine (axial marrow) and the femur. It correlates with bone complications, correlates with QCSI and demonstrates high inter-observer stability. It provides a sensitive means of monitoring bone marrow changes in response to imiglucerase and can be carried out retrospectively to enable central reading of MRI's from various centres.

In the Netherlands the Academic Medical Center is appointed a governement funded centre for Gaucher disease. The departments of metabolic diseases in adults (Dr. C Hollak), biochemistry (Prof dr. J. Aerts) and radiology (Dr. M. Maas, dr. E Akkerman) provide an interactive multidisciplinairy approach in Gaucher disease evaluation and monitoring. Furthermore both fundamental and clinical research is conducted.

Abstracts

Scientific Sessions

–

Room “Beethoven”
Level 1

Scientific Sessions
Friday 9th of June - Room "Beethoven" (Level 1)

Session 1

08:30 Therapeutic Ablation Of The Infrapatellar Fat Pad Under Ultrasound Guidance: A Pilot Study
Dr C. House; Dr D.Connell (United Kingdom)

08:40 Ultrasound guided autologous blood injection for patella tendinosis
Dr Steven James; Dr Chris Pocock; Dr Jonathan Bell; Dr David Connell (England)

08:50 Retears of postoperative meniscus: MR and MRA imaging signs
MD Paolo Cardello (Italy); MD Carlo Gigli (Italy)

09:00 Indirect MR Arthrography in Clinically Healed Menisci after Repair Using Bioabsorbable Arrows
drs Y. Krebbers; drs F.E.M. van Erp Taalman Kip; dr W.J. Willems; dr H.J. van der Woude (The Netherlands)

09:10 COMBINED INJURIES OF THE POSTERIOR CRUCIATE LIGAMENT AND POSTEROLATERAL CORNER.
MD Eva LLopis San Juan; MD PilarFerrer; MD Victoria Higueras; MD Mario Padron; MD Luis Cerezal (Spain)

09:20 Anterior Femoral Condylar Chondromalacia In Patients With Patello-Femoral Disease At MRI : Prevalence and Clinical Significance
Dr Irene Mwangi; Dr Peter MacMahon; Prof Stephen Eustace (Ireland)

09:30 Do MRI features at baseline predict radiographic joint space narrowing in the medial compartment 2 years later?
MD Ruby Sharma; MD Stella A Botha-Scheepers; MD Peter R Kornaat; MD Margreet Kloppenburg; MD Marie-Pierre Hellio Le Graverand; FRCP, FRCR Iain Watt (The Netherlands, USA, United Kingdom)

09:40 MRI of chronic menisco-femoral ligament tear clinically mimicking a bucket-handle meniscal tear
Dr. Erika Ulbrich; Prof. Lynne S. Steinbcah; Dr. Lorin Bennecker; PD Dr. S. Anderson (Germany, USA)

Session 2

10:30 Keynote Lecture: Imaging of tropical infections
Dr. R. Arkun (Turkey)

10:45 Retropharyngeal tendinitis: A rare or a common condition?
MD John Gelineck; MD Mette Salomonsen; Chiropractor Carsten Hviid (Denmark)

10:55 T2 mapping of hip articular cartilage in healthy volunteers at 3T: Topographic Variation
Dr Atsuya Watababe; Dr Chris Boesch; Dr Klaus Siebenrock; Dr Takayuki Obata; Dr Suzanne E. Anderson (Switzerland, Japan)

11:05 Gd-DTPA enhanced cartilage imaging: Evaluation of a method for selectively imaging proteoglycan concentration within articular cartilage
Dr. E.Wiener; Dr. K.Woertler; Dr. M.Settles; Prof. E. J. Rummeny

11:15 Whole Body Low Dose CT: Dose Optimization and Comparision with Skeletal Survey in the Staging of Multiple Myeloma
Dr Tadhg Gleeson; Mr Pat Kenny; Dr Peter O'Gorman; Prof Stephen Eustace (Ireland)

11:25 Bone Marrow in Beta-Thalassemia Major: Magnetic Resonance (MR) Imaging Features and Correlation with Iron Stores and Treatment Protocols
Drakonaki E; Karantanas A; Maris T; Maragaki S; Papadakis A; Gourtsoyiannis N (Greece)

11:35 Whole Body Diffusion-Weighted Image: a novel technique to evaluate patients with bone metastases
MD Joan C. Vilanova; MD Joaquim Barceló; MD Miguel Villalón; MD Eduard Riera (Spain)

Session 3

13:30 Rotator cuff tears: Assessment with MR arthrography in 250 patients with arthroscopic correlation
S. Waldt; K. Woertler; M. Bruegel; A. Burkart; E.J. Rummeny

13:40 Subacromial bursography in rotator cuff impingement. Correlation between findings at MRI and patient outcome
Dr Niamh Hambly; Dr Peter McMahon; Dr Deirdre Duke; Dr Stephanie Forde; Prof Stephen Eustace (Ireland)

13:50 Distal clavicular bone marrow edema and osteolysis: MR evidence of subchondral fractures
Dr Ara Kassarjian (USA); Dr Eva Llopis San Juan (Spain); Dr William E. Palmer (USA)

14:00 MR Arthrography of the Shoulder, Wrist and Hip: Relationship between visualization of intraarticular structures and time elapsed between intraarticular injections of contrast agent
Dr. Gustav Andreisek; Dr. Sylvain R. Duc; Dr. John M. Froehlich; Prof. Juerg Hodler; PD. Dr. Dominik Weishaupt (Switzerland)

14:10 Validity of Radial Inclination Angle in Predicting the Prognosis of Rheumatoid Arthritis Affecting Distal Radioulnar Joint
Dr. Nuran SABIR; Dr. Seyhan TANRIVERDI; Dr. Veli COBANKARA; Dr. Fahir DEMIRKAN; Dr. Yilmaz KIROGLU (Turkey)

14:20 Routine versus selective MSCT in the early evaluation of blunt trauma patients: preliminary results of a prospective evaluation of the impact of additional findings.
MD M. Brink; MD J. Deunk; MD H.M. Dekker; MD, PhD M.J.R. Edwards; MD, PhD C. van Kuijk; MD, PhD J.G. Blickman; MD, PhD A.B. van Vugt (The Netherlands)

14:30 MRI as a problem solving tool in patients with complications following total hip replacement.
Dr Jennifer Kerr; Dr Ciaran Johnston; Dr Deirdre Duke; Dr Stephanie Ford; Dr Peter McMahon; Dr Stephen Eustace (Ireland)

14:40 MR Imaging Findings of Femoroacetabular Impingement
James SLJ; Ali K ; Malara F ; Poole RD ; Young D ; O'Donnell J ; Connell DA

Session 4

15:30 Keynote Lecture: Advanced Spinal Intervention
Dr. F. Aparisi (Spain)

15:45 Vertebral Body Bone Marrow Patterns on Magnetic Resonance Imaging Correlated with DEXA-derived Bone Density Values.
Dr. Jennifer Kerr; Dr. Julie O'Brien; Dr. Deirdre Duke; Dr. Stephanie Forde; Dr. Peter Mac Mahon; Dr. Stephen J. Eustace (Ireland)

15:55 Management of cervical radicular pain-A study of the efficacy of selective nerve root blocks
Mr Daniel Lewis; Mr Vasudev Shanbhag; Dr A Mukherjee; Dr K Lyons; Mr A Jones; Mr J Howes; Mr P Davies; Mr S Ahuja

16:05 A prospective study of effectiveness of Nerve Root Blocks in lumbar disc herniation-Size does not matter!!
Mr Vasudev Shanbhag; Mr Stuart James; Dr S Evans; Dr K Lyons; Dr C Hammer; Dr D Lloyd; Mr A Jones; Mr J Howes; Mr PR Davies; Mr Sashin Ahuja

16:15 CT in computer assisted orthopaedic surgery: A training model in spinal surgery
Dr PJ Richards; Dr IC Kurta; Mr V Jasani; Dr A Rahmatalla; Professor G MacKenzie; Mr J Dove (UK)

16:25 Spinal MRI findings in chronic Ankylosing Spondylitis: Is it really burnt out?
Dr S Suresh; Dr L Goh; Dr A Gafoor; Dr P M Hughes; Dr P Hickling (UK)

16:35 The MRI Foraminal Encroachment Sign In Spondylolisthesis: Contribution Of Disc Protrusion To Exit Foraminal Stenosis
Dr Peter MacMahon; Dr D Taylor; Dr Deirdre Duke; Dr D Brennan; Prof Stephen Eustace (Ireland)

16:45 Recommendations for skeletal survey in spinal tuberculosis-An Indian Experience.
Dr Vikas Tandon; Dr Hemant Sharma; Dr Mathew Varghese (India-54)

16:55 Evaluation of Marrow volume on Whole Body MRI and subsequent comparison with bone density and serum cytokine levels
Dr. Julie O'Brien; Dr. Jennifer Kerr; Dr. Peter McMahon; Dr. Eoin Cotter; Dr. Peter Doran; Prof. Stephen Eustace (Ireland)

Scientific Sessions
Saturday 10th of June - Room "Beethoven" (Level 1)

Session 5

08:30 ROLE OF TENDON POSITION DURING DOPPLER SONOGRAPHY FOR NEOVASCULAR TENDINOPATHY
Dr joanna m farrant; Dr philip j o'connor; Dr andrew j grainger (United Kingdom)

08:40 Ultrasound guided injections for diagnosis and treatment of iliopsoas impingement syndrome in metal-on-metal hip resurfacing arthroplasty.
Mr Sharad Bhatnagar; Mr Matt Revel; Mr Ed Davis; Dr Priya Bhatnagar; Dr Gina Allen; Mr Andrew Pearson; Mr Ronan Treacy (United Kingdom)

08:50 CONTRAST ENHANCED ULTRASOUND WITH SECOND GENERATION CONTRAST AGENT (SONOVUE) IN PROFESSIONAL ATHLETES INSERTIONAL TENDINOPATHY
Prof. Eugenio Genovese; Dr. Leonardo Callegari; Dr.ssa Anna Leonardi; Dr.ssa Maria Gloria Angeretti; Prof. Carlo Fugazzola (Italy)

09:00 How far can ultrasound help in the diagnosis of a diabetic hand?
Dr. Nuran SABIR; Dr. Birnur TAVASLI; Dr. Semin FENKCI; Dr. Nevzat KARABULUT; Dr. Baki YAGCI (Turkey)

09:10 Ultrasound of the palmar cutaneous branch of the median nerve
Dr Alberto Tagliafico; Dr Nunzia Pignataro; Dr Enrico Capaccio; Dr Nicola Stagnaro; Dr Stefano Bianchi; Prof. Carlo Martinoli (Italy, Switzerland)

09:20 Evaluation of normal and pathologic appearance of Achilles' tendon with elastosonography: present and future applications.
Dr. Luca Sconfienza; Prof. Enzo Silvestri; Dr. Francesca Lacelli; Dr. Bruno Bartolini; Prof. Carlo Martinoli; Prof. Giacomo Garlaschi (Italy)

09:30 Ultrasound of volar plate injuries
Dr. Enrico Capaccio; Dr. Beatrice Damasio; Prof. Xavier Demondion; Prof. Anne Cotten; Dr. Stefano Bianchi; Prof. Carlo Martinoli (Italy, France, Switzerland)

09:40 Role of ultrasound guided drainage of hematoma in muscle strains. Personal experience.
Dr. Leonardo Callegari; Dr.ssa Anna Leonardi; Dr. Amedeo Bini; Prof. Eugenio Genovese; Prof. Carlo Fugazzola (Italy)

Session 6

10:30 Skeletal Hemangiomatosis – Evaluation of 15 new Cases
Prof. Dr. med. Freyschmidt; Dr. med. Sternberg; Prof. Dr. med. Ostertag

10:40 POSTCHEMOTHERAPY EVALUATION OF EWING' S SARCOMA BY MR IMAGING: A MULTICENTRIC STUDY
Drs Heyman S; Drs Van Herendael B; MD Stam M; MD Peersman B; MD Brys P; MD, PhD Verstraete KL; MD,PhD Vanhoenacker FM; MD,PhD Hogendoorn P; MD,PhD Bloem Johan; MD, PhD De Schepper AM (Belgium, The Netherlands)

10:50 OSTEOID OSTEOMAS AND BONE METASTASIS: OUR EXPERIENCE IN RADIOFREQUENCY ABLATION (RFA) TREATMENT
MD Sophia Mylona; MD Evangelia Stroumpouli; MD Maria-Sofia Grammenou-Pomoni; MD Niki Lepida; MD Miltiadis Gravanis; Dr Loukas Thanos (Greece)

11:00 The healing pattern of osteoid osteomas on CT and MRI after thermocoagulation
MD G. Vanderschueren; MD PhD J.L. Bloem; MD PhD W.R. Obermann; MD PhD A.R. van Erkel (Belgium, The Netherlands)

11:10 Magnetic resonance imaging in dactylitis – what is the site of the inflammation?
dr Clare Groves; dr M Chandramohan; dr Paul Healy; dr Philip Helliwell

11:20 Subcutaneous epidermoid cyst : MR findings in four cases with characteristic debris on T2-weighted images
Dr Meylaerts L.; Dr Brys P.; Dr Pans S.; Dr Samson I.; Prof Dr De Wever I.

11:30 Pre- operative accuracy of CT Guided Biopsy in the Assessment of Musculoskeletal Tumours
Dr Stephen Schlicht; Dr Peter Smith; Dr John Slavin; Dr Guilio Comin; Prof Peter Choong; Mr Gerard Powell; Dr Shalini Amukotuwa (Australia)

11:40 MRI Detection of Vascular Encasement by Soft Tissue Tumours and its Relevance in Differential Diagnosis.
Dr. F Alyas; Dr. J Lee; Dr. M Ahmed; Miss K. Ali; Dr. D Connell; Dr. A Saifuddin (United Kingdom)

Scientific Session 1
Chairs: P. Brys (Belgium) and G. Astrom (Sweden)

Therapeutic Ablation Of The Infrapatellar Fat Pad Under Ultrasound Guidance: A Pilot Study
Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 08:30

Dr C. House; Dr D.Connell (United Kingdom)

Purpose / Introduction
To describe the technique of ablation of the infrapatellar fat pad using alcohol injection under ultrasound guidance and to assess the efficacy of the procedure in the relief of pain arising from fat pad impingement.

Materials and methods
Consecutive patients with anterior knee pain and pathology in the infrapatellar fat pad, confirmed on MR imaging, were enrolled in the study. A cocktail of alcohol and local anaesthetic was injected under ultrasound guidance, with repeat injections at three-weekly intervals. Twelve patients (7 male, 5 female), mean age 30.8 years, underwent the procedure. Visual Analogue Scale pain scores were recorded before treatment and at the end of the treatment course.

Results
Prior to treatment, the mean (±SD) pain score was 7.75(±1.14). Patients underwent a mean of 4 injections (range 2-6). Following treatment, the mean pain score was 2.92(±2.61), representing a decrease of 62%, $p<0.001$. Follow-up data was complete for all 12 patients. Other than short-lived pain at the time of injection, no serious side-effects were encountered.

Discussion
In patients with pain due to inflammation of the infrapatellar fat pad, ultrasound-guided alcohol ablation of the fat pad can provide effective symptom relief. The results of this pilot study indicate that a larger study is warranted to assess the long-term benefits of this well-tolerated procedure.

Ultrasound guided autologous blood injection for patella tendinosis
Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 08:40

Dr Steven James; Dr Chris Pocock; Dr Jonathan Bell; Dr David Connell (United Kingdom)

Purpose / Introduction
To evaluate the efficacy of ultrasound guided autologous blood injection for the treatment of patella tendinosis.

Materials and methods
48 knees in 44 patients (34 men, 10 women, mean age 35.2 years, age range 17-54 years) underwent sonographic examination of the patella tendon following referral with a clinical diagnosis of patella tendinosis (mean symptom duration 13 months). Ultrasound guided dry needling of the tendon was performed, followed by injection of autologous blood into the site of patella tendinosis on two occasions, 4 weeks apart. Pre and post procedure (VISA) scores were collected to assess patient response to treatment. 21 patients (24 knees) returned for follow up sonographic evaluation.

Results
Therapeutic intervention led to a significant reduction in VISA score when pre and post procedure scores were compared (mean pre-procedure score 39; range 8-72; mean post procedure score 68; range 29-100; mean score improvement 32). Follow up sonographic assessment revealed a reduction in overall tendon thickness and in the size of area of tendinosis (hypoechoic/anechoic areas within the proximal patella tendon). Furthermore, a reduction was identified in interstitial tears within the tendon substance. Interestingly, neovascularity did not reduce significantly and indeed was more dramatic on follow up in a number of patients.

Discussion
Autologous blood injection can provide an excellent treatment in patients with patella tendinosis. It should be stressed however that in this patient group, physiotherapy is a vital adjunct to alter any inherent abnormal biomechanics that this patient group frequently demonstrate.

Retears of postoperative meniscus: MR and MRA imaging signs

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 08:50

MD Paolo Cardello; MD Carlo Gigli

Purpose / Introduction
The purpose of this study is to determine the usefulness of MR signs in diagnosing retears of post-operative meniscus using a low-field strength extremity–only magnet(Artoscan M. Esaote).

Materials and methods
We retrospectively reviewed postoperative knee MR images obtained between July 2004 and December 2005 in 123 consecutive patients (75 male and 48 female patients; mean age 42 years; age range 18-65 years) who were experiencing pain after meniscal repairs. All patients had pre-operative knee MR images and post-operative MR exams were perfomed 5-23 months after meniscal repairs. 35 patients underwent second-look arthroscopy after post-operative MR examinations. MR images were obtained with a 0.2 T extremity-only magnet (Artoscan M Esaote. Genoa Italy) using a standard knee coil supplied by the manufacturer: T1 weighted SE, T2 weighted turbo SE, GE short inversion recovery and T1 weighted GE 16 high resolution. MR arthrography was performed after injection of approximately 20-40ml of Gadoterate meglumine (Dotarem 0.0025 mmol/ml/ Artirem. Guerbert): T1 weighted SE, T1 weighted GE 3D and T2 weighted turbo SE.

Results
In 23 patients there were no morphologic changes of the menisci; in 25 patients after reshaping of the inner meniscal margin, the meniscus appeared blunted; in 75 menisci, morphologic changes were found.
18 menisci showed improvement with no abnormal signal intensity present on the post-operative examination; 59 patients had grade 3 signal intensity remains at T1 weighted sequences in the post-operative meniscus , referred to as "intrameniscal signal conversion"; T1 weighted images in 36 postoperative menisci showed grade 3 signal intensity and additionally the presence of fluid within a line that extended to an articular surface at T2 weighted images, confirming recurrent or residual tear.
10 symptomatic patients showed a tear at a location other than the old repair site or a displaced meniscal fragment. The presence of cartilage abnormalities was seen in 77 patients and was thought to be related to pain.

Discussion
Comparing MR findings pre and post-operative, a diagnosis of tear can be safely made if the MR image shows: 1. morphologic changes; 2. unequivocal T2 increase in signal intensity of a full thickness defect (when grade 3 signal intensity at T1 weighted images is the only abnormality present, then MRA is recommended to assist in the diagnosis of meniscal retear); or 3. a tear at a site different from that previously repaired or an obviously displaced meniscal fragment.

Indirect MR Arthrography in Clinically Healed Menisci after Repair Using Bioabsorbable Arrows

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 09:00

drs Y. Krebbers; drs F.E.M. van Erp Taalman Kip; dr W.J. Willems; dr H.J. van der Woude (The Netherlands)

Purpose / Introduction
Identification of residual or recurrent tears in partially resected or repaired menisci can be complex due to variable signal changes related to meniscal fixation that may interfere with abnormalities secondary to recurrent tearing. High signal intensity on T2-weighted images may reflect (partial) residual or recurrent meniscal tearing, but this sign is not sensitive. Invasive MR arthrography is probably the most reliable method to indicate recurrent lesions. Literature on the use of noninva-

sive indirect MR arthrography in the postoperative knee is relatively scarce.
This study focused on the analysis of MR findings in a group of patients with clinically healed meniscal repair using bioabsorbable arrows with emphasis on T2-weighted images and indirect MR arthrography.

Materials and methods
19 patients who underwent 20 meniscal repairs using 'Bio fix arrows' previously, were examined by physical examination and MR imaging. Follow-up duration after repair was 1.8-3.7 years (mean, 2.5 yrs). MR images were performed using coronal and sagittal PD and T2-weighted sequences and a delayed fat-suppressed T1-weighted sequence after i.v. Gd injection (indirect arthrogram). Analysis of the MR examinations was focused on morphology and signal intensities of the menisci:

group 1 Normal or almost normal SI on PD, T2 and T1-CE sequences, normal morphology: considered successful meniscus repair without residual abnormalities
group 2 Linear SI within meniscus increased on PD and T1-CE sequences, normal on T2, normal morphology: considered successful repair with scar
group 3 SI within meniscus increased on PD, T2 and T1-CE sequences, irregular demarcation and contrast medium tracking within liniar abnormality: considered scar with potential partial residual or recurrent tear
group 4 Signal abnormalities distant from repair site with or without displaced fragment: considered new meniscus tear

Results
7 patients were encountered in group 1 and 2 each. Five patients showed signs consistent with group 3. Two of these patients showed signs of meniscal pathology at physical examination, three had no symptoms. No group 4 patients were seen. Concomitant findings at MR examination consisted of apexitis, synovitis, chondropathy and re-tear of an anterior cruciate ligament reconstruction.

Discussion
Menisci after repair with bioabsorbable arrows that are clinically stable may show several MR patterns, some of them imitating retear. Imbibition of contrast-medium using indirect MR arthrography may increase the suspicion of recurrent tearing opposed to other intra-articular pathology. In clinically equivocal cases with knee pain after meniscal repair, indirect MR arthrography therefore seems justified to be used as a standard protocol.

COMBINED INJURIES OF THE POSTERIOR CRUCIATE LIGAMENT AND POSTEROLATERAL CORNER.

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 09:10

MD Eva LLopis San Juan; MD Pilar Ferrer; MD Victoria Higueras; MD Mario Padron; MD Luis Cerezal (Spain)

Purpose / Introduction
The purpose of this study is to review the spectrum of radiological findings of combined injuries of the posterior cruciate ligament and posterolateral corner, comparing them with surgical planning and results; and to describe MRI appearance of normal anatomy of the posterior corner structures.

Materials and methods
15 patients with posterior cruciate ligament rupture in conjunction with posterolateral corner injuries were retrospectively reviewed. All cases are surgically proven. MRI was performed in a 1T and 1.5T unit using a standard knee protocol. 12 Patients with clinical or radiological suspected complete knee dislocation underwent angioCT, except one in whom conventional angiography was performed to rule out popliteal artery injury.

Results
The mean age was 27 years (ranged from 14 to 57), with male predominance (11/4). All patients had posterior cruciate ligament tear, grade 3 PCL tear was present in 13 patients and grade 2 (partial tear) in 2 patients. Involved posterolateral corner structures were the lateral collateral ligament, popliteus tendon and popliteofibular ligament in 13 patients, and lateral collateral ligament rupture in 2. Associated injuries were anterior cruciate ligament tear in 12, 6 patients had avulsion of the fibular head (arcuate sign), 7 patients had biceps tendon injury, medial meniscus tear in 5 and lateral meniscus tear in 2 patients. Surgery demonstrated peroneal nerve injury in 3 patients.

Reconstruction surgery during the acute phase (within 3 weeks after trauma) was performed in 12 patients, while 2 patients with a chronic setting underwent surgical augmentation and one patient a total joint replacement.

Discussion
1. Combined PCL and posterolateral soft tissue injury generally necessitates surgical reconstruction of all ligament injuries to avoid progressive joint instability and to avoid excessive strain and instability in the setting of cruciate ligament repair or reconstruction.
2. Assessment of posterolateral corner injuries may be difficult especially in the setting of coexistent cruciate ligament rupture. Therefore, MRI evaluation is essential to determine the extend and location of bone and soft tissue injuries. When 3 or more major ligaments injuries occur popliteal artery injury must be ruled out with angioCT (to avoid conventional angiography).
3. The knowledge of the arcuate complex is necessary to obtain an accurate diagnosis.
4. Early diagnosis and treatment permit reconstruction and improves surgical outcome.

Anterior Femoral Condylar Chondromalacia In Patients With Patello-Femoral Disease At MRI : Prevalence and Clinical Significance

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 09:20

Dr Irene Mwangi; Dr Peter MacMahon; Prof Stephen Eustace (Ireland)

Purpose / Introduction
To determine prevalence and significance of chondromalacia of the anterior femoral condyle (AFC) in patients presenting with anterior knee pain thought secondary to patello-femoral disease.

Materials and methods
50 consecutive patients with proven patello-femoral disease and symptoms referable to the anterior knee joint were included for study. In each case, record was made of age, sex, patello-femoral disease distribution and degree, trochlear groove angle, trochlear shape index (TSI), Wiberg patella shape and the presence or absence of concomitant soft tissue derangement.

Results
Average age of group was 43.6yrs, 22 males and 28 females. Disease affected the lateral patella facet in 44 patients and the lateral AFC in 45 patients. In 12%, disease affected the lateral AFC only. The average trochlear groove angle for patients with AFC disease was 141.8 degrees, compared to 133.8 degrees for patients with disease limited to the lateral patella facet ($p = 0.002$). Patients with AFC disease had a TSI of 7.3, compared to an index of 5.7 for those with disease limited to the patella ($p = 0.029$). In 95.1% the degree of patella facet chondromalacia was best assessed using axial images. This contrasts with AFC disease which was best assessed with sagittal images in 86.7%.

Discussion
Chondromalacia, as part of patello-femoral disease, affects the anterior margin of the lateral femoral condyle as frequently as the lateral patella facet. In a significant number of patients, chondromalacia is isolated to the lateral femoral condyle sparing the lateral patella facet. A shallow trochlear groove is associated with an increased risk of chondromalacia of the lateral AFC. Disease on the AFC is best assessed using sagittal images rather than axial. AFC disease, unless specifically sought for, may be overlooked as the source of clinical symptoms.

Do MRI features at baseline predict radiographic joint space narrowing in the medial compartment 2 years later?

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 09:30

MD Ruby Sharma; MD Stella A Botha-Scheepers; MD Peter R Kornaat; MD Margreet Kloppenburg; MD Marie-Pierre Hellio Le Graverand; FRCR Iain Watt (USA, The Netherlands)

Purpose / Introduction
The purpose of the study is to associate magnetic resonance (MR) imaging parameters with radiographic progression of knee OA measured by joint space narrowing (JSN) after 2 years.

Materials and methods
MR images of the knee at baseline and standardised postero-anterior fixed-flexion radiographs at baseline and after 2 years were obtained from 186 patients (20% male; aged 43-76 years; mean age 60 years) who had been diagnosed with symptomatic OA at multiple joint sites (GARP-study).
MR images were analysed by 2 experienced readers on a validated subjective scoring system (KOSS1) for bone marrow oedema (BME), cysts, osteophytes, cartilage defects, joint effusion and meniscal pathology at different anatomical locations in the medial compartment.
Radiographs were scored without knowledge on the chronological order by 2 experienced readers for JSN in the medial tibio-femoral joint, semi-quantitatively, using the Altman atlas (grade 0-3) and quantitatively, using digital callipers from a medical imaging program. Radiological progression was considered as an increase of at least 1 grade in the Altman score and a decrease of more than 0.50mm in the quantitative JSN assessment.
Logistic regression was used to odds ratios (OR) with 95% confidence intervals (CI), adjusted for age, sex, body mass index and family effect, to assess the association between MRI parameters and radiological progression.

Results
Respectively 17 (9.1%) and 30 (16.1%) of the 186 patients showed radiological progression using the Altman index and the quantitative measurement. Of the 186 patients, 23% had BME lesions, 14% had cysts, 80% had osteophytes, 60% had cartilage defects, 64% had effusion, 27% had meniscal subluxation and 47% had meniscal tears.
Only meniscal tears (OR 4.0; 95% CI 1.1-15.0) and meniscal subluxation (OR 3.2; 95% CI 1.2-8.6) out of all imaging parameters were associated with radiological progression as assessed by the Altman score, although there was a trend for BME, osteophytes, cysts and cartilage defects to be associated. No association between MR imaging parameters and radiological progression were found using quantitative measurements.

Discussion
Meniscal pathology (tears and meniscal subluxation) was the only MR imaging parameter associated with subsequent radiological progression, as assessed by the Altman score, on a radiograph 2 years later. The role of BME in early OA remains ambiguous.

MRI of chronic menisco-femoral ligament tear clinically mimicking a bucket-handle meniscal tear

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 09:40

Dr. Erika Ulbrich; Prof. Lynne S. Steinbcah; Dr. Lorin Bennecker; PD Dr. Suzanne Anderson (Switzerland; USA)

Purpose / Introduction
This is a retrospective study to review the MRIs of 8 patients presenting clinically with knee locking after sporting injury or minor trauma and concern for bucket handle meniscal tear.

Materials and methods
Eight patients (5 males, 3 females) with average age of 26.5 years and range of 8 to 43 presented with intermittent locking of the knee joint, minimal knee pain and clinical concern for a bucket handle tear. All images were reviewed by 2 senior musculoskeletal radiologists and a junior in training. All anatomical structures were analyzed. Clinical notes (n=8) and surgical notes (n=3) were reviewed.

Results
Six of eight histories involved sporting injuries approximately one week to three months prior to presentation. Deep meniscofemoral ligament tear of the MCL was evident (n=8). This was associated with soft tissue mass effect 1 cm above the superior aspect of the medial meniscus surface. The volume of the mass effect ranged from 0,6 mm3 to 3,3 mm3 with an average of 1,4 mm3. No bucket handle meniscal tears or flipped menisci were evident. Additional lesions included anterior cruciate ligament tears (n=4), medial menisco-capsular separation (n=4), and lateral meniscal tear (n=1). Surgical correlation was available in three patients and five were treated conservatively.

Discussion
Deep MCL tears with mass effect may rarely present clinically with knee locking mimicking a bucket

handle meniscal tear. The etiology is presumed due to an inflammatory reaction with possible scarring analogous to the cyclops lesion of the anterior cruciate ligament tear, or the anterolateral impingement associated with anterior talofibular ligament tears. In this entity and the above described entities there is a pseudoinflammatory fibrovascular-like process which creates a mass-like effect associated with relative instability and an impingement-like syndrome.

Scientific Session 2
Chairs: I. Van Breuseghem (Belgium) and H. Karlinger (Hungary)

Keynote Session: Imaging of tropical infections
Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 10:30

R. Arkun (Turkey)

Inflammatory and infectious disorders of the musculoskeletal system affect the bones, contiguous soft tissues, muscles, and joints. Although, hemaatogeneous spread is the most common type due to Stphylococcus aureus for bone and soft tissue infections, different microorganisms can cause infectious changes such as mycobacterium tuberculosis, viral, fungal and parasitic organisms. Among the musculoskeletal infections fungal and parasitic disease are not frequent as much as specific and nonspecific infectious disease. Both fungal and parasitic bone infections are rare disorders and incidence of the disease is related to geographic distribution, ethnic and and nutritional factors and occupation. Immunocompromise and ease of travel can lead to increased incidence. Clinical appearance can be seen as osteomyelitis, arthritis and/or pyomyositis. In diagnosis, computed tomography, isotope studies, ultrasound exam and magnetic resonance imaging are useful but don't have specific signs for determination of infective organism which lead to the disease. Diagnosis is possible with a high index of clinical suspicition and aspiration or biopsy is necessary for definitive diagnosis.

Retropharyngeal tendinitis: A rare or a common condition?
Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 10:45

MD John Gelineck; MD Mette Salomonsen; Chiropractor Carsten Hviid (Denmark)

Purpose / Introduction
Retropharyngeal tendinitis is hypothesized to be a rare condition with less than 100 cases reported in literature. The aim of this study was to test this hypothesis.

Materials and methods
Retropharyngeal tendinitis is best known in chiropracty. All members of the Danish Society of Chiropractic and Spinal Biomechanics were contacted and 16 clinicians answered positively.
The patients reported were 19 males and 28 females, aged 22-73 years (mean 47.7 years). Examinations took place between 1987 and 2005. Only patients with radiographs were included. All patients had standard radiographic examinations of the neck with sagittal and frontal views and four patients also had MRI performed.
The patients presented with acute serious atraumatic neck pain and dysphagia.
The anteroposterior diameter of the retropharyngeal space was measured from the most ventral aspect of the C2 to the posterior wall of the retropharyngeal space. A skeletal radiologist and a chiropractor evaluated the images in consensus.

Results
All patients had retropharyngeal soft tissue swelling on lateral radiographs. The swelling corresponded to the longus colli muscle between C1 and C5. The anteroposterior diameter of the swelling was 4-12 mm (mean 8.1 mm). 43 patients had a well-defined ovoid calcification anterior to C2. Most patients were treated with high doses of non-steroidal anti-inflammatory drugs for one week and the pain disappeared after 8 days.

Discussion
Retropharyngeal tendinitis is a calcifying tendinitis of the longus colli muscle. The calcification

consists of crystals of hydroxyappatite. These crystals inflict a foreign body inflammatory response causing a well-defined oedema confined to the superior part of the longus colli muscle. It is considered a rare condition. Differential diagnoses include retropharyngeal abscess, meningitis and trauma. However, calcification and soft tissue swelling are characteristics of this condition only. It is important to chiropractors and radiologists to know the features of retropharyngeal soft tissue swelling and calcification on plain film. Moreover, it is important to know the diagnostic criteria on MRI as MRI is increasingly becoming the first choice of diagnostic modality in suspected acute spinal disease.
We found 47 patients with retropharyngeal tendinitis. It thus seems to be a much more common condition than previously reported in literature.

T2 mapping of hip articular cartilage in healthy volunteers at 3T: topographic variation

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 10:55

Dr Atsuya Watababe; Dr Chris Boesch; Dr Klaus Siebenrock; Dr Takayuki Obata; Dr Suzanne E. Anderson (Switzerland, Japan)

Purpose / Introduction
Evaluating the condition of the cartilage is important for obtaining better outcomes of joint-preserving treatments in hip joints. T2 mapping, a quantitative magnetic resonance (MR) imaging technique that can evaluate the integrity of collagen fiber in the cartilage, was recently developed. Its ability to detect the early degeneration of cartilage has been validated in clinical studies mainly in the knee joint; however, there has not yet been a detailed study in the hip joint. The aim of the current study, therefore, was to investigate the topographic variation of T2 in the normal hip cartilage using the 3 Tesla MR scanner as a standard value for further studies.

Materials and methods
Both hip joints of 12 healthy volunteers (6 males and 6 females; mean age ± SD = 29.5 ± 4.9 years) were studied. MR imaging was performed using a 3 Tesla magnet. T2 measurement was performed in the oblique-coronal plane using multiecho-spin echo sequence with the following parameters: repetition time = 1500 msec; ten echo times of 10.3 to 103 msec; field of view = 150×150 mm; section thickness = 4.0 mm; 512×512 matrix. T2 maps were generated using MATLAB software (The Mathworks, Natick, MA). The region of interest was drawn over the weight-bearing area (loaded) of both femoral and acetabular cartilage. The region of interest was also drawn over the infero-medial part of the femoral cartilage, which was defined as the non-weight bearing area (unloaded).

Results
The average T2 of the loaded femoral and acetabular cartilage and the unloaded femoral cartilage were 32.38 ± 1.85, 32.43 ± 1.63 and 28.90 ± 1.83 (mean ± SD) respectively. There was no significant difference between the T2 in the loaded femoral and acetabular cartilage, whereas the T2 of the unloaded femoral cartilage was significantly lower than that of the others. There was no statistical difference in the T2 of each part of cartilage with respect to laterality, age, gender, or body mass index.

Discussion
The T2 values for cartilage obtained here were comparable to those previously reported for knee cartilage. The discrepancy between the T2 of the loaded and unloaded cartilage within the hip joint may be due to regional differences of structure of the collagen matrix between loaded and unloaded cartilage. Similarity of the T2 within the loaded femoral and acetabular cartilage along with a lack of a difference in laterality may be clinically useful to identify "cartilage at risk".

Gd-DTPA enhanced cartilage imaging: Evaluation of a method for selectively imaging proteoglycan concentration within articular cartilage

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 11:05

Dr. E. Wiener; Dr. K. Woertler; Dr. M. Settles; Prof. E. J. Rummeny (Germany)

Purpose / Introduction
To verify the assumption of a linear relationship between the T1 relaxation time in presence of Gd-DTPA (Magnevist®) and the proteoglycan concentration within cartilage. Therefore tissue distributions of relaxation times of selectively proteoglycan and collagen depleted cartilage in presence of Gd-DTPA were compared and correlated with the histological findings.

Materials and methods
MR studies were performed with nine bovine patellae. Three specimens were exposed to papain-solution for proteoglycan depletion, to collagenase-solution for collagen depletion and to buffer solution without enzymatic treatment. Then, patellae were placed in 2.5 mM of Gd-DTPA solution and high resolution (slice thickness 2.5 mm, in plane resolution 300 ìm) T1-weighted SE, T1- and T2-parameter images were acquired on a 1.5 T scanner every 30 minutes over 11 hours. T1 and T2 relaxation time were calculated throughout cartilage thickness and compared for intact, proteoglycan- and collagen-depleted cartilage. Furthermore matrix-degradation was correlated with histological findings.

Results
Histological findings demonstrate that enzymatic treatments, successfully altered the concentration of collagen and proteoglycan selectively within cartilage. For proteoglycan and collagen degraded cartilage a significant decrease of T1 and T2 in presence of Gd-DTPA was observed. The T1- and T2-effects were of the same magnitude and depended on the depth of the cartilage layers, most pronounced in superficial layers (about 1 mm) and less pronounced in the deeper calcified layers. But there was no difference in either T1 or T2 in the presence of Gd-DTPA between proteoglycan and collagen degraded cartilage.

Discussion
Gd-DTPA enhanced cartilage imaging can demonstrate early changes in osteoarthritis but can not selectively differentiate between proteoglycan and collagen loss. Thus the T1 relaxation time in presence of Gd-DTPA is not a selective indicator for the proteoglycan concentration within cartilage.

Whole Body Low Dose CT: Dose Optimization and Comparision with Skeletal Survey in the Staging of Multiple Myeloma

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 11:15

Dr Tadhg Gleeson; Mr Pat Kenny; Dr Peter O'Gorman; Prof Stephen Eustace (Ireland)

Introduction
With the exponential expansion of CT as a major diagnostic imaging modality, highly detailed, visually-pleasing images are often being obtained at the expense of patient dose. Exposure to ionizing radiation is a significant problem, particularly where multiple imaging techniques are being employed. One such patient cohort are multiple myeloma patients who currently undergo skeletal survey, PET and whole body low dose CT, as well as whole body MRI in the staging of their disease.

Purpose
To optimise CT parameters using a cadaver model to minimise dose while maintaining diagnostic quality, and to employ these new parameters in multiple myeloma staging to assess diagnostic accuracy of lower dose CT when compared with the current gold standard (skeletal survey).

Materials and methods
Ethics approval was obtained from Mater Hospital and UCD ethics Committees. A cadaver was imaged using variable parameters. Images were reviewed by 2 radiologists at separate sittings, blinded to dose parameters.
16 whole body scans were assessed in 4 regions, and graded from 1-5. Scoring system was validated with kappa statistic. Doses were calculated using Caredose software.
Lowest dose achieved with diagnostic images was chosen and employed in a clinical setting on patients referred for myeloma staging. Ten anatomical regions were assessed and graded 0-3 according to the extent of disease. Findings were compared with skeletal survey graded in a similar fashion.

Results
All scans were diagnostic. Lowest dose using 80kV, 25mAs was selected for clinical protocol. To date 12 patients have been enrolled. Whole body low dose CT was compared with skeletal survey using whole body MRI, serum and urinary electrophoresis and bone marrow trephine as gold standard. Preliminary results suggest that whole body low dose CT is more sensitive than skeletal survey in the assessment of location and number of lytic bone lesions in patients with multiple myeloma.

Discussion
Whole body low dose CT is more sensitive than skeletal survey in the detection of lytic lesions of multiple myeloma. Doses can safely be reduced to levels equivalent or less than that of a skeletal survey in staging patients with multiple myeloma.

Bone Marrow in Beta-Thalassemia Major: Magnetic Resonance (MR) Imaging Features and Correlation with Iron Stores and Treatment Protocols

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 11:25

Drakonaki E; Karantanas A; Maris T; Maragaki S; Papadakis A; Gourtsoyiannis N (Greece)

Purpose / Introduction
To describe the MR imaging features of bone marrow in beta-thalassemia major (BTm) and investigate their relation with liver iron siderosis and chelation protocols.

Materials and methods
Bone marrow was prospectively assessed on abdominal MR studies of 40 BTm transfusion-dependent patients (mean age 30+/-6.4 years) undergoing quantification of hepatic siderosis and 15 healthy controls, using T1 (120/4/90), PD (120/4/20) and T2* (120/9/20)-w GRE sequences. Bone Marrow was assessed by measuring the signal intensity (SI) of the trabecula in the body of the first lumbar vertebra. SI ratios of liver and bone marrow to paraspinal muscles (L/M and B/M respectively) were calculated on each MR sequence. Serum ferritin levels and chelation protocols were recorded.

Results
Bone marrow hypointensity in at least one sequence was displayed in 28 (70%) patients, while 12 (30%) patients presented with normal B/M on all MR sequences. No correlation between B/M and L/M was found, whereas B/M correlated with mean ferritin values in all sequences (Pearsons correlation, r=-0.564, p~0 in T1, r=-0.562, p~0 in PD and r=-0.471, p=0.003 in T2* respectively). Ferritin values correlated with L/M in all sequences (Pearsons correlation, r=-0.454, p=0.003 in T1, r=-0.381, p=0.01 in PD and r=-0.278, p=0.05 in T2* respectively). None of the patients presented with focal areas of abnormal SI indicative of focal lesions in the lumbar vertebrae. B/M ratio was higher in patients receiving oral chelation therapy in comparison to those on subcutaneous protocols (ANOVA, $p<0.04$).

Discussion
Bone marrow hypointensity, reflecting iron deposition, is a common MR imaging finding of BTm patients. The degree of marrow siderosis, expressed as B/M ratio, correlates with serum ferritin levels and chelation protocols but not with liver siderosis.

Whole Body Diffusion-Weighted Image: a novel technique to evaluate patients with bone metastases

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 11:35

MD Joan C. Vilanova;MD Joaquim Barceló; MD Miguel Villalón; MD Eduard Riera (Spain)

Purpose / Introduction
To compare the diagnostic value of a novel technique using whole body diffusion weighted image (WBDWI) versus bone scintigraphy for patients with bone metastases.

Materials and methods
24 patients with suspected bone metastases from various oncologic diseases were prospectively

examined with whole body MRI on an automatic moving table. The WBDWI technique was acquired at 1.5T (GEMS), using a SE-EPI sequence (b=600) in the axial plane on 5 stations (acquisition time = 10 min) from the head to the calfs. High resolution multi-planar reformat and maximum intensity projection (MIP) were performed from the data set to display the whole body coronal image with PET-like image contrast (Virtual PET-MRI). Coronal STIR and FSE T1 of the whole body, and sagittal FSE T1 of the spine were also acquired. We compared WB-MRI and bone scintigraphy findings. Metastatic lesions were confirmed by follow-up over 6 months or biopsy. All the images from each modality were read independantly by two readers with discrepancies resolved by consensus. Whole Body MRI (WB-MRI) and the scintigraphy findings were evaluated and compared as to the presence or not for metastases, either for the patient in general as for the different bone regions. Seven bone regions in each patient were assessed (total of 168 sites) from each modality.

Results
14 patients had bone metastases in a total of 54 sites. WB-MRI showed 96% (52/54) of the metastases from the skeletal sites and scintigraphy revelead 52% (28/54). WB-MRI was superior to bone scintigraphy to detect bone metastases with a sensitivity of 100%,14/14 (bone scintigraphy: 71%,10/14), a specificity of 90%, 9/10 (scintigraphy: 80%,8/10) and an accuracy of 96% (scintigraphy: 75%). WB-MRI showed additional metastases in extra-skeletal regions of the body in 10 patients (42%). Whole Body Diffusion-weighted technique showed all the bone lesions, including the affected ribs, but except for the osteoblastic metastases. WBDWI demonstrated all the extra-skeletal lesions: liver, lung and lymph nodes metastases.

Discussion
Whole Body Diffusion Weighted technique is a fast and effective method for evaluating the entire skeleton in patients with suspected bone metastases, supplying additional information to the STIR and T1 sequences. Moreover, WBDWI has significant higher sensitivity and specificity to scintigraphy for detecting bone metastases, and also can detect extra-skeletal lesions.

Scientific Session 3
Chairs: R. Arkun (Turkey) and J.-L. Drape (France)

Rotator cuff tears: Assessment with MR arthrography in 250 patients with arthroscopic correlation
Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 13:30

S. Waldt; K. Woertler; M. Bruegel; A. Burkart; E.J. Rummeny (Germany)

Purpose / Introduction
To assess the diagnostic accuracy of MR arthrography in the diagnosis of rotator cuff tears of the shoulder.

Materials and methods
MR arthrograms obtained in 250 patients including a study group of 120 patients with arthroscopically proved rotator cuff tears and a control group of 130 patients with intact rotator cuff tendons were reviewed in random order. MR imaging was performed on a 1.0 T system (Magnetom Expert, Siemens). MR arthrograms were analyzed by two radiologists in consensus for partial- and full-thickness tears of the supraspinatus, infraspinatus and subscapularis tendons.

Results
At arthroscopy 189 rotator cuff tears were diagnosed, including 67 partial- (58 supraspinatus and 9 infraspinatus) and 122 full-thickness (62 supraspinatus, 36 infraspinatus, 24 subscapularis) tendon tears. For full-thickness tears the sensitivity, specificity, and accuracy were 92%, 98%, and 97% respectively, and for partial tears 73%, 97%, and 88% respectively. False negative assessments in the diagnosis of partial-thickness tears were predominantly (85%) observed with very small articular-sided tendon tears.

Discussion
MR arthrography is highly accurate in the diagnosis of full-thickness rotator cuff tendon tears, but is less accurate in the diagnosis of partial-thickness tears, mainly due to limitations in the differentia-

tion between very small articular-sided partial-thickness tears and frayed or friable tendon margins and/or synovitic changes at the tendon margin.

Subacromial bursography in rotator cuff impingement. Correlation between findings at MRI and patient outcome

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 13:40

Dr Niamh Hambly; Dr Peter McMahon; Dr Deirdre Duke; Dr Stephanie Forde; Prof Stephen Eustace (Ireland)

Purpose / Introduction
To review the impact of image guided subacromial bursography in the treatment of rotator cuff impingement and to correlate clinical impact with pre-procedural findings at MRI.

Materials and methods
75 patients referred for shoulder MRI and image guided subacromial bursography between January 2003 and January 2006 were included for study. All MRIs were reviewed by two radiologists and the findings graded according to severity. 80 mg of methylprednisolone was injected into the bursa following contrast bursogram in each case. Patient characteristics and ultimate outcome were determined retrospectively by telephone audit at a mean follow up of 6 months.

Results
Complete resolution of symptoms was recorded in 45 of 75 patients. In the remaining 30 patients, 17 reported reduction in pain. No patients reported exacerbation of symptoms and there were no significant side effects. Correlation was noted between duration of symptoms and outcome. There was no correlation between age and patient outcome. All 28 patients with isolated bursitis showed complete resolution of symptoms while outcome in patients with rotator cuff pathology was less predictable.

Discussion
Image guided subacromial bursography is an effective treatment for patients with MRI proven rotator cuff impingement and bursitis. Outcome correlates with duration of symptoms and pre procedural findings at MRI.

Distal clavicular bone marrow edema and osteolysis: MR evidence of subchondral fractures

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 13:50

Dr Ara Kassarjian; Dr Eva Llopis San Juan; Dr William E. Palmer (USA, Spain)

Purpose / Introduction
To investigate the association between distal clavicular bone marrow edema and osteolysis and subchondral fractures of the distal clavicle on MR imaging.

Materials and methods
This study was approved by the hospital human research committee, which waived the need for informed consent. Two radiologists retrospectively analyzed 36 shoulder MR examinations in patients with imaging findings of distal clavicular bone marrow edema and/or osteolysis. The presence of a subchondral fracture of the distal clavicle, abnormalities of the acromioclavicular joint, rotator cuff tears and labral tears were assessed by MR imaging.

Results
At MR imaging, 31 of 36 patients (86%) had a subchondral line within the distal clavicular edema, consistent with a subchondral fracture. 32 of 36 patients (89%) had fluid in the acromioclavicular joint while 27 of 36 patients (75%) had cysts or erosions in the distal clavicle. 13 patients (36%) had associated labral tears while 8 patients (22%) had partial thickness rotator cuff tears.

Discussion
A distal clavicular subchondral fracture is a common finding in patients with imaging evidence of distal clavicular bone marrow edema and osteolysis. These subchondral fractures may be responsi-

ble for the propensity of findings occurring on the clavicular side of the acromioclavicular joint.

MR Arthrography of the Shoulder, Wrist and Hip: Relationship between visualization of intraarticular structures and time elapsed between intraarticular injections of contrast agent

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 14:00

Dr. Gustav Andreisek; Dr. Sylvain R. Duc; Dr. John M. Froehlich; Prof. Juerg Hodler; PD. Dr. Dominik Weishaupt (Switzerland)

Purpose / Introduction
Knowledge about the temporal behavior of the intraarticularly injected gadolinium based contrast agent is of practical importance since the amount of fluid within the joint and the signal characteristics exhibited by the injected contrast agent are closely related to a successful MR arthrogram. Hence, the purpose of this study was to investigate the relationship between visualization of intraarticular structures and time elapsed between intraarticular injection of contrast agent and MR imaging in symptomatic patients referred for MR arthrography (MRA) of the shoulder, wrist and hip.

Materials and methods
Local ethical committee approved study. We prospectively studied 11 shoulders, 11 hips, and 10 wrists. All patients underwent baseline MRA within 20 minutes following intraarticular injection of the gadolinium (time point (TP) 1). Subsequent MRI at another four different time points after contrast injection was performed (TP 2 = 45min; TP 3 = 90min; TP 4 = 180min; TP 5 = 240min). T1-weighted spin-echo (SE) sequences with and without fat suppression were performed at all five time points. Contrast-to-noise ratio (CNR) were measured on all sequences at each TP. Three observers assessed joint distension, as well as the degree of visualization of different anatomical structures at each TP using a 4-point scale (0 = not assessable; 1 = poor; 2 = moderate; 3 = good).

Results
For all joints, CNR measurements demonstrated peak of CNR at TP 1 and 2 with a subsequent, near logarithmic decline of CNR values over time. When a score cut-off value of 2,5 was defined as lower limit to obtain images of sufficient quality to make a clinical diagnosis, image quality was insufficient for clinical diagnosis at TP 3 in 3/11 shoulders (27%), and in 3/11 hips (27%) for both the fat-suppressed and the non-fatsuppressed T1-weighted sequences. In 2/10 wrists (20%), image quality was insufficient for clinical diagnosis at TP 2.

Discussion
For MR arthrography the degree of visualization of intraarticular anatomical structures depends on the time elapsed between the contrast injection and MR imaging. For MR arthrography of the shoulder and hip, MR imaging should be performed within 60 minutes after contrast injection, and MR arthrography of the wrist should be performed within 45 minutes after the injection.

Validity of Radial Inclination Angle in Predicting the Prognosis of Rheumatoid Arthritis Affecting Distal Radioulnar Joint

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 14:10

Dr. Nuran SABIR; Dr. Seyhan TANRIVERDI; Dr. Veli COBANKARA; Dr. Fahir DEMIRKAN; Dr. Yilmaz KIROGLU (Turkey)

Purpose / Introduction
To assess the radial inclination angle (RIA) in rheumatoid arthritis and to study the relationship between RIA and distal radioulnar joint (DRUJ) instability.

Materials and methods
Radiological Larsen scoring of visible changes, RIA measurement and activity scoring (according to Stanford health assessment questionnaire) were done in 74 wrists of 37 patients with rheumatoid arthritis (age of 53 ±10.2 years) and compared to 42 normal wrists in 21 subjects (age 57.4 ± 10.9 years) taken as a control group. Conventional radiography and computerized tomography (CT) were performed to measure DRUJ space and different methods were obtained by CT to quantify

subluxation of DRUJ. Rheumatoid factor (RF), erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) were also studied.

Results
In the study group, values of Larsen score were increased (1.21 ± 1.65) whereas DRUJ space measurement (1.73 ± 0.75mm) and activity score (8 ± 3.1) showed a decrease compared to the control group (0.23 ± 0.43, 2.25 + 0.39mm and 10.2 ±1.56) respectively(P=0.0001).
RIA was also measured to be lower in the study group (17.8° ± 2.9) compared with the control group (23.4° ± 2.8) and was significantly correlated with DRUJ space (r = 0.561, P=0.0001), activity score (r=0.533,P=0.001) and DRUJ dorsal subluxation (P=0.028). However RIA negatively correlated with Larsen score (r= - 0.676, P= 0.0001), RF(r=-0.31, p=0.019), ESR(r=-0.38, p=0.004) and CRP (r=-0.29, p=0.022) levels. On the other hand, Larsen score highly correlated with disease duration (r= 0.560, P= 0.0001)) and DRUJ dorsal subluxation (P=0.024) whereas Larsen score negatively correlated with DRUJ space (r= - 0.682, P= 0.0001) and activity score (r= -0.714, P= 0.0001).

Discussion
Radial inclination angle diminishes with the development of DRUJ dorsal subluxation in rheumatoid arthritic patients who show increased Larsen score. Therefore, RIA can be helpful in assessing joint instability.

Routine versus selective MSCT in the early evaluation of blunt trauma patients: preliminary results of a prospective evaluation of the impact of additional findings.

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 14:20

MD M. Brink; MD J. Deunk; MD H.M. Dekker; MD, PhD M.J.R. Edwards; MD, PhD C. van Kuijk; MD, PhD J.G. Blickman; MD, PhD A.B. van Vugt (The Netherlands)

Purpose / Introduction
Multislice computed tomography (MSCT) in trauma is fast and sensitive. Compared to conventional radiography, MSCT may detect a substantial amount of additional potentially life threatening diagnoses, especially in severely injured trauma patients. However, if used as a screening ("routine") modality in less injured patients as well, this additional diagnostic value might be outweighed by the adverse effects of CT, like time delay in diagnosis, operating costs and even radiation related health risks.
The purpose of this study is to evaluate the diagnostic benefit of screening versus selective total body MSCT in all injured patients that were involved in a blunt high-energy trauma mechanism.

Materials and methods
Patients admitted to our emergency department that met the inclusion criteria of our high-energy trauma protocol, were prospectively enrolled in this study. According to this protocol, patients underwent (1) clinical evaluation, (2) conventional radiography of the whole spine, the thorax and the pelvis including focused abdominal ultrasound and (3) 16 slice CT of thorax and abdomen (including spine and pelvis). Although all patients had the same standardized CT protocol, we prospectively recorded if CT of the thorax, abdomen, pelvis and spine were either requested as a trauma screening investigation, or otherwise as a selective supplement to previous abnormal clinical and/or conventional imaging results. This method was approved by the hospital ethics committee. Diagnostic value of (either routine or selective) CT was determined as additional findings on CT compared to conventional examination imaging. In addition, impact of these additional findings on patient management was recorded.

Results
From May 2005- January 2006 225 consecutive patients entered the protocol. In 47% of 220 patients with one or more routine CT's, this yielded unexpected diagnoses, which caused a change of management in 35 (16%). Routine CT showed most additional diagnoses of the thorax (in 37% of 186), leading to a change in management in 21 patients (11%).
Of all 175 patients with one or more selective CT's, we recorded additional injuries in 60 (34%) and a change in management in 44 (25%). Of 39 selective thorax CT's, 82% showed one or more unexpected diagnoses; 41% of these 39 induced a change in management.

Discussion
After high energy trauma, routine total body CT appears to have a substantial additional diagnostic benefit, especially concerning injuries of the thorax. However, this additional benefit is far less than in the case of selective CT.

MRI as a problem solving tool in patients with complications following total hip replacement.

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 14:30

Dr Jennifer Kerr; Dr Ciaran Johnston; Dr Deirdre Duke; Dr Stephanie Ford; Dr Peter McMahon; Dr Stephen Eustace (Ireland)

Purpose / Introduction
To assess the role of MRI as a problem solving tool in patients with failed total hip replacement without a diagnosis following conventional imaging assessment.

Materials and methods
28 patients with an unexplained failed total hip replacement following conventional radiological assessment underwent additional MR imaging with an optimised turbo- spin echo sequence. Images were reviewed by two musculoskeletal radiologists by consensus and compared to findings at surgery, response following image guided intervention or clinical follow-up.

Results
Of 28 patients, MR revealed an unsuspected diagnosis explaining the cause of prosthesis failure in 15 patients. Subsequently 8 patients out of this group of 15 underwent minimally invasive image guided intervention which obviated the need for revision total hip replacement. No cause for prosthesis failure was identified in 13 patients.

Discussion
MR may be successfully undertaken in patients following total hip replacement and when performed frequently leads to an unsuspected diagnosis allowing informed patient management. In this study it allowed the identification of an unsuspected diagnosis in greater than 50% of the cases.

MR Imaging Findings of Femoroacetabular Impingement

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 14:40

James SLJ; Ali K; Malara F; Poole RD; Young D; O'Donnell J; Connell DA

Purpose / Introduction
To evaluate non-contrast MR imaging in the identification of labral and articular cartilage lesions in patients with a clinical suspicion of femoroacetabular impingement.

Materials and methods
Pre-operative MR imaging was performed in 46 consecutive patients (26 males, 20 females, age range 21-45 years, mean age 32.3 years) with a clinical suspicion of femoroacetabular impingement. Two musculoskeletal radiologists independently assessed the MR images for the presence and anatomical site of labral pathology, labral-chondral transitional zone pathology, femoral cartilage lesions and acetabular cartilage lesions. Surgical correlation was obtained in all cases by two surgeons experienced in hip arthroscopy.

Results
Seven patients demonstrated labral tears on MR imaging and this was confirmed surgically in all cases. There were 37 patients (97%) who had lesions of the labral-chondral transitional zone on MR imaging compared with 38 surgically confirmed cases. The site of labral-chondral transitional zone pathology at arthroscopy was as follows: 50% anterosuperior, 36% anterosuperior/superolateral, 11% superolateral and 3% superolateral/posterosuperior. The site was identified correctly in between 92% (Reader 1) and 95% (Reader 2) of cases on MR imaging. Separate acetabular cartilage abnormality was surgically identified in 39% and femoral cartilage lesions were found in 20% of

cases. The acetabular chondral lesions were correctly identified in between 89% to 94% of cases.

Discussion
MR imaging provides a useful assessment of patients with a clinical suspicion of femoroacetabular impingement. A high resolution, non-arthrographic technique can provide preoperative information regarding the presence and anatomical site of labral and cartilage abnormality.

Scientific Session 4
Chairs: J. Vandevenne (Belgium) and F. Aparisi (Spain)

Keynote Lecture: Advanced Spinal Intervention
Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 15:30

Dr. F. Aparisi (Spain)

The possibility to see inside the human body and to discover anatomical alterations of premature form has carried us, to think that by means of most minimum invasive techniques we would be able to carry out efficient treatments. In the muscle-skeletal pathology field, the spine pain problems represent a so much, an important chapter by the number of patients affected as by the associate-labor repercussions, therefore no wonder that, many opinions about the type of treatments exist.

We do not know to certainly which is the origin of the pain, but we know that a bad correlation between anatomical findings and pain exists.

The correlation of bony lesions with symptoms does not have large problems of interpretation because the anatomo-clinical correlations are good. Nevertheless in the remainder areas not the same thing occurs.

For the diagnosis of the vertebral bony lesions at present, we employ the percutaneous biopsies with a high degree of security and very high reliability.

Thanks to the introduction of sure tools for the percutaneous vertebral access several techniques of treatment have been developed: Embolizations, vertebroplasty, kyphoplasty, removals by radio frequency, backfill by means of biological cements are methods of conclusive treatment and therefore they have reached a level of indisputable acceptance, with indices of very next reliability al level 1 (5/5), according to criteria of evidence-based medicine.

The discal and joint lesions do not possess a degree of anatomical correlation as in the bony and keeping in mind these prior considerations, is easy to understand the one that have themselves proposed techniques of diagnosis based on the provocation. The positive answer to a test of provocation or of anesthetic blockade permits us to affirm with a degree of very high reliability that the explored area is the responsible for the pain. Once it located the responsible area we can act against the inflammation that is the main one responsible for the pain or to prolong the sensitive blockade, if the information disappear, disappear the symptoms.

We can consider that the responsible for the symptoms are five: The bones, the intervertebral disks, the joint facets, the nervous roots and the sacroiliac joints, without unanimity about the proportions existing that each one of them correspond.

Even as in the bony lesions and in absence of a good correlation, our action can be double: As diagnostic test or as method of treatment.

As diagnostic test and according to the criteria of the evidence-based medicine the results obtained are. : The facet blockades and the discography are very goods (4/5), while the perineural injections and sacroiliac joints have smaller effectiveness (3/5).

As technique of treatment.: Our action can be double, to fight the cause that produces it or

blocking the neural information. In the first group we include the anti-inflammatory methods. We observe that: The facet infiltrations provide us a moderate result (3/5), the discal infiltration high (4/5), also high the perineural (4/5) and those of sacroiliac also moderate (3/5).

In the second group we include the continuous blockade of the sensibility, whether by means of physical and chemical methods. In this group we observe that: The blockades of the recurrent one are moderate (3/5) or good (4/5), when we employ radiofrequency. The discal electrotermy (IDET) is useful a high proprorción, (4/5), themselves not perineural treatments are carried out due to the functional repercussions and the results obtained in the treatment of the sacroiliac joints are moderate (3/5).

The most frequent origin of the discal lesion and joint illness is degenerative, therefore is easy to understand that the results to long be not very good, but is debatable that the long-term results of the surgery be excellent.

Our results agree with them obtained in the majority of series, that place to these procedures as excellent methods.

The main objective of this communication is to expose the last methods of diagnosis and treatments that there are employee and to recommend the CT as the best and surer tool for its execution.

Vertebral Body Bone Marrow Patterns on Magnetic Resonance Imaging Correlated with DEXA-derived Bone Density Values.

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 15:45

Dr. Jennifer Kerr; Dr. Julie O'Brien; Dr. Deirdre Duke; Dr. Stephanie Forde; Dr. Peter MacMahon; Dr. Stephen J. Eustace (Ireland)

Purpose / Introduction
To determine whether lumbar spine bone marrow patterns MRI correlate with DEXA scan-derived bone density values.

Materials and methods
107 patients (67 female and 40 male), age range 20-82 years (mean age 45.7years) underwent DEXA scan imaging followed by T1 weighted sagittal MR imaging of the lumbar spine. The DEXA scans were graded as follows; t-score >-1=normal bone density, t score <-1 and >-2.5= osteopenia and t score <-2.5=osteoporosis. Lumbar spine bone marrow patterns on MR T1 sagittal imaging were graded by 2 radiologists, blinded to the DEXA scan results, as follows; type I: cellular marrow, type II: early fatty infiltration, type III: moderate fatty infiltration and type IV: complete fatty replacement.

Results
61/107 patients had type I marrow pattern on MR imaging and all had normal bone density on DEXA imaging. 23/107 patients had type II marrow pattern on MR imaging. Of these 12/23 (52%) patients had normal bone density, 5/23 (22%) patients had osteopenia and 6/23 (26%) patients had osteoporosis on DEXA imaging. 13/107 patients had type III marrow pattern on MR imaging. Of these 1/13 (8%) patients had normal bone density, 1/13 (8%) patients had osteopenia while 11/13 (84%) patients had osteoporosis. 10/107 patients had type IV marrow pattern on MR imaging. Each of these recorded osteoporosis on DEXA imaging.

Discussion
There is a strong correlation between bone marrow patterns and DEXA scan derived bone density at the extremes. Patients with type I marrow pattern had normal bone density while patients with type IV marrow pattern had osteoporosis. The association between bone density and marrow pattern is less clearly defined for type II and type III.

Management of cervical radicular pain-A study of the efficacy of selective nerve root blocks

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 15:55

Mr Daniel Lewis; Mr Vasudev Shanbhag; Dr A Mukherjee; Dr K Lyons; Mr A Jones; Mr J Howes; Mr P Davies; Mr S Ahuja

Purpose / Introduction
To investigate the clinical outcomes, and the requirement of surgery following selective nerve root block performed for cervical radicular pain in patients with MRI proven disc pathology.

Materials and methods
Thirty consecutive patients with cervical radiculopathy and correlating MRI pathology were studied. Mean age of patient was 46yrs (range 28-64yrs). Twenty nine of the thirty patients also complained of associated neck pain. All underwent fluoroscopically guided, selective cervical nerve root block with steroid (20mg Depomedrone) and local anaesthetic (0.5ml Bupivocaine 0.25%). Radiographic contrast was used to confirm needle position. All procedures were conducted by the same clinician. Pre- and post-procedure pain and physical function scores were noted using the standard SF 36 questionnaire, as well as whether subsequent surgery was required. Mean follow up time was seven months (range 2-13 months).

Results
81% of patients reported an improvement in arm pain, and 66% in neck pain following the procedure. 77% of patients had an improvement in pain score (mean improvement 16 points). 68% of patients had an improvement in physical function score (mean improvement 20 points). At the time of follow up only one patient had undergone surgery for cervical radicular pain.

Discussion
This study suggests that fluoroscopically guided selective nerve root block is a clinically effective interventional procedure in the management of cervical radicular pain, and may prevent the need for open surgery.

A prospective study of effectiveness of Nerve Root Blocks in lumbar disc herniation-Size does not matter!!

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 16:05

Mr Vasudev Shanbhag; Mr Stuart James; Dr S Evans; Dr K Lyons; Dr C Hammer; Dr D Lloyd; Mr A Jones; Mr J Howes; Mr PR Davies; Mr Sashin Ahuja

Purpose / Introduction
Various studies have examined the therapeutic value of nerve root blocks for radicular pain, secondary to lumbar disc herniation .There is limited information describing correlation between quantitative measurements on MRI scans of disc herniation , percent canal compromise and the outcome of nerve root blocks.
The purpose of this study is to determine if the size of disc herniation has any bearing on the efficacy of lumbar nerve root blocks.

Materials and methods
This is a prospective study in which 25 patients who were refered to radiologists for selective lumbar root blocks were recruited and given Oswestry Disability Index(ODI) Questionnaires and SF 36 forms prior to the procedure and at 6 weeks and 12 weeks after the procedure.MRI images and completed questionnaires were analysed.The axial MRI image showing the largest canal compromise by the herniated disc was selected from the digital image.The percentage compromise of the canal by the herniated disc were measured with commercially available software (Image J). ODIs and Pre and post procedure pain and physical function scores were calculated from SF 36 forms.

Results
Average age was 49.6 yrs(18-80) with interval between MR scans and the procedure averaging 11 months (2-20 mths).36% patients showed improvement in ODI at 6 weeks and 47% at 12 weeks. 26% showed an improvement in physical function scores at 6 weeks rising to 36% at 12 weeks.

Pain scores showed an improvement in 56% of patients at 6 and 12 weeks. Scores were compared between with 255,25-50% and more than 50% canal compromise. No significant difference in outcomes was noted. Sub group analysis was performed to study the significance of interval between scans and the nerve root injection.

Discussion
Our study concludes that the size of disc herniation has no bearing on the outcome of selective nerve root blocks.

CT in computer assisted orthopaedic surgery: A training model in spinal surgery

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 16:15

Dr PJ Richards; Dr IC Kurta; Mr V Jasani; Dr A Rahmatalla; Professor G MacKenzie; Mr J Dove (United Kingdom)

Purpose / Introduction
1. Quantify the benefit of computer assisted orthopaedic surgery (CAOS) pedicle screw insertion in a porcine cadaver model.
2. Compare the surgeons new to CAOS and varying experience of pedicle screw insertion.
3. See if CT with extended windows was an acceptable method to evaluate the position of the pedicle screws, compared to dissection.

Materials and methods
12 six months old porcine lumbar spines CT'ed pre-operatively for the CAOS computer database. Computer randomisation allocated the specimens to the surgeons, and 2 pedicles at each vertebral level between conventional free hand insertion and image guided surgery (NAVITRAK®) using 6.5mm cancellous AO screws.
Post-operatively, spiral CT with extended windows was blindly evaluated by an independent radiologist and the spine fellow to assess the accuracy of pedicle screw placement & the inter-/intra-observer reliability of CT was evaluated compared to dissection. The pedicle screw placement was assessed as perfect if within the pedicle along its central axis, or acceptable (within <2mm from perfect), measured in mm from perfect thereafter.

Results
One hundred and sixty six of 168 pedicles in 12 porcine spines, were operated on. Two pedicles fractured, one in each group and three had incomplete data. Complete data was present for 163 pedicles (81 CAOS, 82 freehand). In the CAOS group 84% of screws were deemed acceptable or perfect, compared to 75.6% with the freehand technique. Screw misplacement was significantly reduced using CAOS (p=0.049). 79% of CAOS screws were ideally placed compared with 64% with a conventional freehand technique (p=0.05). A logistic linear regression model showed that the miss placed pedicle screw rate was significantly reduced using CAOS (p=0.047). CAOS benefited the least experienced surgeons most (the research registrars acceptable rate increased from 70% to 90% and the spine fellow from 76% to 86%). CAOS did not have a statistically significant effect on the experienced consultant spine surgeon increasing from 70% to 79% (p=0.39). The experienced general orthopaedic surgeon did not benefit from CAOS (p=0.5). CT compared to dissection showed an intra-observer reliability of 99.4% and inter-observer reliability of 92.6%.

Discussion
1. CAOS improves pedicle placement compared to the freehand technique.
2. Junior surgeons benefited most from CAOS.
3. CAOS with porcine lumbar spines and post operative CT, represents a useful model for pedicle screw placement.
4. Experienced spine surgeons, new to CAOS, may not find it helpful.

Spinal MRI findings in chronic Ankylosing Spondylitis: Is it really burnt out?

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 16:25

Dr S Suresh; Dr L Goh; Dr A Gafoor; Dr P M Hughes; Dr P Hickling (United Kingdom)

Purpose / Introduction

Ankylosing Spondylitis (AS) is a complex debilitating chronic inflammatory disease affecting the sacroiliac joints, spine and less frequently the peripheral joints. Literature review and studies have previously focused on acute MRI (Magnetic Resonance Imaging) changes in early AS. The objective of this study is to evaluate MR changes in thoracic and lumbar spine in patients with well established chronic AS.

Materials and methods

33 patients with chronic AS for more than 10 years were included in the study. These patients fulfilled the New York criteria for diagnosis of AS and were on long term follow-up by the rheumatologists. All patients had MR imaging of their thoracic and lumbar spines employing sagittal T1 and STIR sequences. An MR scoring system (Braun et al) was used to score the spinal changes. Disease activity was determined by Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) and Bath Functional Ankylosing Spondyltis Index (BASFI). Correlation between the MR scores and the disease activity was determined.

Results

The vertebral bodies were the most commonly involved followed by the pedicles, discs and facets joints. Acute inflammatory lesions included anterior marginal osteitis, florid discitis, and acute arthritic changes at costo-vertebral joints. Chronic changes included plain film equivalent of 'shiny corners' and bridging across adjacent vertebra and anterior/posterior fusion of spinal segments.

Discussion

A wide variety of acute inflammatory changes are seen in our patients with well established chronic AS, and emphasizes the importance of MRI in this group of patients. In recent years anti-tumour necrosis factor therapies have been introduced which may potentially influence disease progression. But the introduction of these drugs is largely based on the disease activity indices. The findings of acute inflammatory changes on imaging may also have implications for introduction of treatment and subsequently disease modification.

The MRI Foraminal Encroachment Sign In Spondylolisthesis: Contribution Of Disc Protrusion To Exit Foraminal Stenosis

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 16:35

Dr Peter MacMahon; Dr D Taylor; Dr Deirdre Duke; Dr D Brennan; Prof Stephen Eustace (Ireland)

Purpose / Introduction

To compare the pattern of disc protrusion occurring in patients with spondylolisthesis, with the pattern of disc protrusion occurring in patients without spondylolisthesis and in so doing describe the "Foraminal Encroachment Sign".

Materials and methods

38 patients with lumbar spondylolisthesis and 38 matched control patients with protrusive disc disease at corresponding disc space levels were included for study. The DICOM archived studies were completely re-evaluated at a workstation by two dedicated musculoskeletal radiologists. In each case note was made of the presence or absence and direction of disc protrusion relative to a line drawn parallel to the affected disc space and also the presence and site of neural contact with the protruded disc. Differences in opinion were resolved by consensus.

Results

Each group contained 11 females and 27 males. The mean age of the patients with spondylolisthesis was 51 years (S.D. 17), compared to 49 years (S.D. 16) for the controls. Of 33 patients (86.8%) in the case group, the vertical disc herniation was upward. In 5 (13.1%) it was neutral. In 19 of 38 patients (50%) the disc was in contact with the nerve in the exit foramen, in 9 patients (23.6%) contact was

in the lateral recess. In the control group 3 patients (7.8%) had upward vertical disc herniation, in 12 (31.6%) it was neutral and in 23 (60.5%) it was downward. 7 patients (18.4%) had neural contact within the exit foramen while 27 patients (71%) had contact within the lateral recess. Differences for upward protrusion were significant ($p<0.05$).

Discussion
Disc protrusion in spondylolisthesis is usually upwards and outwards in contrast to protrusion in the native spine. As a result, disc protrusion in spondylolisthesis produces foraminal stenosis with encroachment of the nerve root above the degenerate disc space, while disc protrusion in the native spine produces lateral recess stenosis with encroachment of the nerve root exiting below the degenerate disc. The described pattern of disc migration produces the so termed "Foraminal Encroachment Sign" of spondylolisthesis.

Recommendations for skeletal survey in spinal tuberculosis-An Indian Experience.

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 16:45

Dr Vikas Tandon; Dr Hemant Sharma; Dr Mathew Varghese (India)

Purpose / Introduction
Extrapulmonary tuberculosis accounts for 20% of all MTB infections and of these osteoarticular tuberculosis accounts for 1-5% of all cases. The incidence of tuberculosis has increased by almost 30% annually in the UK. Orthopaedic surgeons are more likely to encounter patients affected with mycobacterium tuberculosis. We present our experience of spinal tuberculosis in an endemic area with a patient population from a large DGH in India.
The prevalence of spinal tuberculosis in osteoarticular tuberculosis was studied. The pattern of involvement of vertebral bodies, skip lesions and management of cases is reviewed.

Materials and methods
A prospective study was conducted and included 88 cases of tuberculosis of the spine during 2001-2003. All patients had detailed general physical and systemic examination. In addition they had routine X-rays and MRI screening.

Results
Neurological deficit was seen in 37 patients (42%).All patients were treated using middle path regime and surgery was performed where indicated. Most common presenting complaint was back pain followed by limb weakness.
Most common objective finding was kyphosis followed by neurological deficit. MRI was found to be the most useful imaging modality.
On average 5 vertebrae were skipped in upward and 4 in downward direction. So we recommend screening of these vertebrae above and below the level of presentation in routine screening of tuberculosis of spine on conventional radiography or MR.
A maximum number of 7 continous vertebrae were involved in diabetic patients. 15% of our patients had associated diabetes.
Patients with pulmonary TB had commonest involvement of the thoracic spine. Significant factors affecting multifocality were DM/Pulmonary TB/ Immunocompromised patients.
Neurological deficit was seen in 37 patients(42%). Surgical intervention done in 16 patients (43%) and the majority had T9 vertebral involvement. All patients with deficit recovered except one who had myelomalacic cord changes. All other 72 patients (81%) showed response to middle path chemotherapy regime .
This study shows the MR incidence of skip lesions to be 20.4% which is far more (4 times) the value observed on radiographs.

Discussion
The middle path has shown very good results without affecting the hospital beds availability as most of the patients can be managed without admissions on braces and rest at home and operation is only required when indicated. This severely cuts down the cost of treatment

Evaluation of Marrow volume on Whole Body MRI and subsequent comparison with bone density and serum cytokine levels

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 16:55

Dr. Julie O'Brien; Dr. Jennifer Kerr; Dr. Peter McMahon; Dr. Eoin Cotter; Dr. Peter Doran; Prof. Stephen Eustace (Ireland)

Purpose / Introduction
To evaluate the relationship between red marrow volume determined by Whole-Body MRI and bone density. In addition, we also aim to evaluate the relationship between serum cytokines levels and these results.

Materials and methods
In total 105 participants were included in this study. In each case bone density was recorded by conventional DEXA scanning. Whole-body MRI was performed on a Philips Intera 1.5 Tesla scanner with a moving table-top using saggital and coronal T1, and coronal STIR sequences to determine red marrow patterns and volume. In addition serum was yielded to determine cytokine levels using conventional ELIZA techniques. The cytokines, chosen due to of their action on the osteoblast/osteoclast cycle and bone marrow included: Bone Morphogenic Protein (BMP), Leptin, TNF alpha and TGF beta. Comparison was then made between these cytokines and the corresponding bone density and marrow volume.

Results
Quantities of total body red marrow as determined by Whole Body MRI appear to correlate with recorded levels of bone density. Similarly there was also a correlation between this relationship and measured serum leptin and BMP levels.

Discussion
Preliminary data suggests that red marrow provides a milieu for healthy bone osteoblasts, and therefore appears to be a significant contributor to the maintenance of bone health. The utility of bone turnover markers as a complement to Bone Mineral Density (BMD) measurements is evolving because bone density measurements only provide information about the current skeletal mass, but does not provide information about the metabolic activity. They cannot however be used alone for screening or diagnosis but may be useful as an adjunct to BMD measurement, for prediction of higher risk patients.

The potential value of Superparamagnetic iron oxide (SPIO) MR contrast agent for differentiating spinal tumors and osteomyelitis.

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 17:05

MD Yuko Fukuda; PhD Kumiko Ando; PhD Ishikura Reiichi; PhD Norio Nakao (Japan)

Purpose / Introduction
The purpose of this study is to evaluate the potential value of Superparamagnetic iron oxide (SPIO) MR contrast agent for differentiating spinal tumors and osteomyelitis.

Materials and methods
6 patients (5 male, 1 female) with lumber pain, three patients with bone metastasis and 3 patients with vertebral osteomyelitis, were examined before and after intravenous injection of 8 μmol Fe/kg ferucarbotran after 3 hours using a 1.5 T MRI with spine coil. Two different sequences were performed; sagittal T2 weighted turbo spin-echo with fat suppression (TSE FS) and short tau inversion recovery sequences(STIR). The signal intensity (SI) of tumor metastasis, normal bone marrow and ostomyelitis were measured in each sequence. The Relative Enhancement (RE) of bone marrow and the contrast to noise ratio (CNR) between tumor metastasis and non-tumor regions, osteomyelitis and non-osteomyelitis regions were calculated.

Results
The SI of tumor metastasis in bone marrow did not change after a ferucarbotran injection, whereas the SI of normal bone marrow and osteomyelitis decreased after 3 hours in both sequences.

The REs using the T2 TSE FS sequence in tumor metastasis and non-tumor regions and osteomyelitis in bone marrow were -8%, -45%, -36% respectively. Using the STIR sequence, the REs of tumor metastasis, non-tumor regions and osteomyelitis in bone marrow were -14%, -53%, - 42 %respectively. The CNR using the T2 TSE FS sequence, between tumor metastasis and non-tumor regions in bone marrow after a ferucarbotran injection was increased (CNRs of the pre and post images were 35.3 and 41.1, respectively). The CNR between osteomyelitis and non-oseteomyelitis regions in bone marrow was decreased (CNRs of the pre and post 17.1 and 15.5, respectively).
Using the STIR sequence, the CNR between tumor metastasis and non-tumor regions in bone marrow after a ferucarbotran injection was increased (CNRs of the pre and post images were 24.1 and 28.4, respectively). The CNR between osteomyelitis and non-oseteomyelitis regions in bone marrow were decreased (CNRs of the pre and post images were 19 and 12, respectively).

Discussion
Ferucarbotran suppresses bone marrow signal on MRI. We suggest that ferucarbotran might be useful to detect bone tumors as a negative contrast medium.

The effect of temperature reduction on cement working time in percutaneous vertebroplasty

Room "Beethoven" (Level 1) - Friday June 9th, 2006 - 17:15

James SLJ, Connell DA

Purpose / Introduction
To measure the effect of temperature reduction on the working time of polymethylmethacrylate (PMMA) cement used in percutaneous vertebroplasty.

Materials and methods
The cement preparation technique consisted of combining the polymethylmethacrylate powder with the methylmethacrylate liquid and shaking the mixture for a period of two minutes as per manufacturer's guidelines (Osteo-FirmTM radiopaque bone cement, Cook). Following this, three 1ml syringes were filled with 1ml of cement before being placed in a temperature regulated environment. At intervals of 4,5,6,7,8,9,10,15,20,25,30,37,45,52,60,75,90 and 105 minutes the cement was assessed to identify whether it could still be injected from the syringe. This was performed at 0,3,6,9,12,15,18,21,24 and 270C to demonstrate the effect of temperature reduction on cement hardening time. The time to cement hardening was measured in 3 degree increments, with an arbitary limit of 27 degrees C being set as the upper limit of room temperature at which the procedure is likely to be undertaken. Temperature regulation of the syringes was performed using a cooling water bath regulated by a thermostat. The 0 degree C temperature was achieved by using an ice bath with a standard thermometer. The cement filled syringes were placed in a waterproof bag to protect them during cooling. They were briefly removed from the water bath to allow cement hardness to be assessed by hand injection before immediately being replaced in the water bath. An end point was reached when injectate no longer flowed in 2 of 3 cement filled syringes.

Results
By reducing the storage temperature of the PMMA cement filled syringes, the period of time before cement hardening occurred was substantially increased. Only a limited increase was identified in working times at the lower end of room temperature (18 degrees C). Once the cement was stored at 12 degrees C or lower, a substantial increase was demonstrated.

Discussion
PMMA cement shows significant differences in working time depending on the temperature at which cement filled syringes are stored. By reducing the temperature, an increase in working time can be achieved. This allows more than one vertebral level to be injected at a time and facilitates training in this technique, with less time pressure during cement injection.

Scientific Session 5
Chairs: G. Vanderschueren (Belgium) and C. Martinoli (Italy)

ROLE OF TENDON POSITION DURING DOPPLER SONOGRAPHY FOR NEOVASCULAR TENDINOPATHY
Room "Beethoven" (Level 1) - Satuday June 10th, 2006 - 08:30

Dr Joanna M Farrant; Dr Philip J O'Connor; Dr Andrew J Grainger (United Kingdom)

Purpose / Introduction
The relevance of neovascularisation in tendinopathy is unclear. Neovascularisation has been linked with symptoms. Novel treatments that target areas of neovascularisation and even the vessels themselves such as sclerosant therapy and dry needling are increasingly being introduced. Optimal demonstration of vascularisation could have substantial diagnostic and therapeutic impact.
This prospective study demonstrates the effect positioning has on the demonstration of neovascularisation in the Achilles tendon using power Doppler ultrasound (PD US).

Materials and methods
20 consecutive patients with Achilles tendinopathy showing neovascularisation were included in the study. The tendons were scanned by the same observer using PD US.
Images were obtained with the tendon relaxed (foot plantar flexed) and with the tendon tense (foot dorsiflexed) using standardised positioning. Doppler calibration was unchanged during the course of each examination. A static image showing the maximum demonstrable PD flow in the tendon in each of the positions was recorded for each patient.
Individual images were subsequently assessed by two experienced musculoskeletal radiologists in random order and the tendon vascularity was graded using a semiquantative scoring system. The observers were blind to clinical details and patient positioning.

Results
Significantly increased PD US grading scores were found in the relaxed (plantar flexed) tendons

Discussion
The Achilles tendon is conventionally scanned in a prone postion with the foot dorsiflexed. However we have demonstrated that in this position neovascularisation will be missed or significantly underestimated. We conclude detection of vessels in tendon disease requires that the tendon is studied in a relaxed position to maximise sensitivity to new vessels, as well as the conventional tense position used for B mode scanning.

Ultrasound guided injections for diagnosis and treatment of iliopsoas impingement syndrome in metal-on-metal hip resurfacing arthroplasty.
Room "Beethoven" (Level 1) - Satuday June 10th, 2006 - 08:40

Mr Sharad Bhatnagar; Mr Matt Revel; Mr Ed Davis; Dr Priya Bhatnagar; Dr Gina Allen; Mr Andrew Pearson; Mr Ronan Treacy

Purpose / Introduction
Iliopsoas impingement syndrome has recently been recognized as a complication of metal-on-metal hip resurfacing arthroplasty. We had in the past inconsistent results with blind Iliopsoas injection techniques. We investigated whether ultrasound guidance for identifying and injecting the lesion relieved the pain and gave more consistently favourable outcomes.

Materials and methods
We followed seven patients prospectively who had been diagnosed with Iliopsoas impingement syndrome. All had diagnosis confirmed by ultrasound and received injection in the area of tendinopathy by ultrasound guidance. We specifically looked at relief of pain following injections.

Results
All patients had at least transient relief of pain (four weeks). Five patients have had continuing pain relief while the other two needed surgery after effects wore off. One of the patients had Iliopsoas tenotomy. The acetabular socket in the other patient had displaced and was rubbing with the

undersuface of Iliopsoas tendon for which he underwent a revision of the acetabular component.

Discussion
Ultrasound is a reliable tool for diagnosis of this condition and ultrasound guided injections provide better pain relief than blind injections. We found that patients with primary IPIS did well after ultrasound guided injections. In the two patients who did not respond well to injections, ultrasound helped in diagnosing the condition after which they underwent definitive treatment to rectify the problem.
Ultrasound guided injections can be used as a diagnostic and therapeutic tool. Ultrasound imaging can help diagnose the condition, and an ultrasound guided injection can differentiate the pain due to IPIS from other causes.

CONTRAST ENHANCED ULTRASOUND WITH SECOND GENERATION CONTRAST AGENT (SONOVUE) IN PROFESSIONAL ATHLETES INSERTIONAL TENDINOPATHY

Room "Beethoven" (Level 1) - Satuday June 10th, 2006 - 08:50

Prof. Eugenio Genovese; Dr. Leonardo Callegari; Dr.ssa Anna Leonardi; Dr.ssa Maria Gloria Angeretti; Prof. Carlo Fugazzola (Italy)

Purpose / Introduction
Chronic insertional tendinopathy is a typical disease in track-and-field sports athletes.
The aim of this study was to evaluate, by contrast enhanced ultrasound, the presence of microcirculation and/or intratendinous neoangiogenesis and its correlation with painful symptoms.

Materials and methods
20 athletes (age range 22-34 years) with insertional tendinopathy (Achilles tendon, patellar tendon and ischio-crural compartment) had a US examination. All patients were investigated by conventional, dynamic and colour Doppler US examination, combined with contrast enhanced ultrasound with second generation contrast agent (Sonovue). 9/20 patients has been evaluated by using both US and MR examinations.

Results
In all cases sonography examination diagnosed insertional tendinopathy.
In 11/20 cases contrast enhanced ultrasound examination allowed to point out peri-tendinous tissue neoangiogenesis (bursae, peritenon), in 6/20 cases the same method identified the presence of intratendinous neoangiogenesis.

Discussion
In chronic insertional tendinopathy, contrast enhanced ultrasound can easily demonstrate intratendinous and peri-tendinous reactive inflammatory changes. This additional information is useful in professional athletes' therapeutic planning.

How far can ultrasound help in the diagnosis of a diabetic hand?

Room "Beethoven" (Level 1) - Satuday June 10th, 2006 - 09:00

Dr. Nuran SABIR; Dr. Birnur TAVASLI; Dr. Semin FENKCI; Dr. Nevzat KARABULUT; Dr. Baki YAGCI (Turkey)

Purpose / Introduction
To detect the musculoskeletal disorders of diabetes affecting the hand by ultrasonography (US) and to study the relationship of these changes with the arterial Doppler blood flow pattern.

Materials and methods
Both hands of 23 diabetic patients (age 53 ± 11.3 years) (10 female, 13 male) were examined by US and compared to age and sex matched control group (age 53 ± 11.1 years). Median nerve diameters, area and circumference measurements, flexor retinaculum thickness and tendinopathic changes as decrease in echogenicity, peritendinous fluid collection were studied. Arterial Doppler echo pattern of radial, unlar and palmar arch arteries have also been studied. Clinical findings as arthralgia, numbness and limited joint mobility were recorded.

Results
Patients group showed a significant increase (P<0.01) in median nerve diameters (3.8 × 5.1 mm), nerve area (15.5 ± 5.1 mm²), nerve circumference (14.3 ± 2.4 mm) and flexor retinaculum(FR) thickness measurements (2.1 ± 0.3 mm), compared with the control group values (2.7 × 4.0 mm, 8.7 ± 1.9 mm², 11.1 ± 1.3 mm, 1.7 ± 0.1 mm, respectively). Monophasic arterial flow pattern was seen in 28 out of 46 hands and revealed a significant correlation with FR thickness (r=0.508, P=0.000), decreased tendon echogenicity (r=0.507, P=0.000), peritendinous fluid collection(r=0.498, P=0.000) and HbA1c (r=0.528, P= 0.000). Clinical findings were also significantly correlated with arterial monophasic flow pattern (r=0.338, P= 0.022), FR thickness (r=0.367, P=0.012), peritendinous fluid (r=0.388, P=0.008), median nerve diameters (r=0.571, P=0.000), median nerve area (r=0.549, P=0.000), and circumference measurements(r=0.550, P=0.000).

Discussion
We can evaluate the musculoskeletal disorders of the diabetic hand by US and the monophasic change in the arterial flow pattern can be used as a predicting factor for the possible changes in the future.

Ultrasound of the palmar cutaneous branch of the median nerve
Room "Beethoven" (Level 1) - Satuday June 10th, 2006 - 09:10

Dr Alberto Tagliafico; Dr Nunzia Pignataro; Dr Enrico Capaccio; Dr Nicola Stagnaro; Dr Stefano Bianchi; Prof. Carlo Martinoli (Italy, Switzerland)

Purpose / Introduction
The palmar cutaneous branch (PCB) of the median nerve arises on the radial side of the median nerve and travels alongside the median nerve, between the palmaris longus and the flexor carpi radialis, to emerge in the palm. The aim of this study was to describe the potential role of ultrasound (US) for evaluation of the PCB of the median nerve.

Materials and methods
Nine consecutive patients with sensory deficit in the palmar triangle and thenar eminence and point tenderness on the palmar aspect of the wrist suggesting a neuropathy of the PCB were evaluated with US by means of 17-5MHz linear-array transducers. Two patients underwent previous carpal tunnel release, one had a tendon transfer procedure; in three cases, the nerve was injured by penetrating trauma, two patients had concomitant carpal tunnel syndrome. Correlative 1.5T MR imaging was performed in six patients.

Results
In all patients, the PCB of the median nerve was identified as a small monofascicular structure from its origin to slightly distal to the wrist crease. Short-axis planes were essential to image this small nerve branch. US allowed detection of a spectrum of nerve abnormalities. In traumatic and postoperative settings, main US findings included encasement of the nerve by overlying hypoechoic scarring tissue or detection of a terminal neuroma. In compressive lesions, hypoechoic fusiform swelling of the nerve while it crossed the antebrachial aponeurosis was observed.

Discussion
High resolution US can identify and characterize abnormalities of the PCB of the median nerve, providing unique information on the entire course of this small nerve branch.

Evaluation of normal and pathologic appearance of Achilles' tendon with elastosonography: present and future applications.
Room "Beethoven" (Level 1) - Satuday June 10th, 2006 - 09:20

Dr. Luca Sconfienza; Prof. Enzo Silvestri; Dr. Francesca Lacelli; Dr. Bruno Bartolini; Prof. Carlo Martinoli; Prof. Giacomo Garlaschi (Italy)

Purpose / Introduction
To evaluate the elastosonographic appearance of normal Achilles' tendon and of the surrounding

structures and to introduce future applications of this new technique in the evaluation of pathologic tendon modifications.

Materials and methods
We performed elastosonography on 82 normal tendons in normal people (age 20-43) and on 28 pathologic ones (20 tendinosis and 8 pathologic fractures), already detected through MRI and US. We used a LOGOS ultra-elastosonographer by Esaote. We performed both axial and longitudinal scans. All subjects were evaluated both in standing position and with the tendon relaxed.

Results
Elastosonography has assessed a high level of resilience in normal tendons. In all pathologic tendons, elastosonography has detected a high loss of this resilience along the complete course of the tendon. Moreover, this technique has allowed us to detect and differentiate the hypoechoic areas of degeneration from the surrounding tendon tissue.

Discussion
Elastosonography of Achilles' tendon allows to complete the morphostructural information given by US with functional information about the modification of its resilience. Moreover, in early pathological tendons, it is more efficient to detect any loss in resilience and therefore allows to make a diagnosis in an earlier stage.

Ultrasound of volar plate injuries

Room "Beethoven" (Level 1) - Satuday June 10th, 2006 - 09:30

Dr. Enrico Capaccio; Dr. Beatrice Damasio; Prof. Xavier Demondion; Prof. Anne Cotten; Dr. Stefano Bianchi; Prof. Carlo Martinoli (Italy, France, Switzerland)

Purpose / Introduction
Rupture of the volar plate, the dense fibrocartilaginous structure forming the palmar aspect of the proximal interphalangeal (P-I-P) joint, is a common complication of hyperextension injury to the finger. The aim of this study was to describe the potential use of high-frequency US for evaluation of volar plate injuries.

Materials and methods
The anatomy of the volar plate and surrounding structures was evaluated on cadaveric fingers and correlated with the US images obtained in 10 healthy subjects. Then, n=15 consecutive patients with a history of hyperextension trauma and clinical findings suggesting volar plate injury at the P-I-P joint were evaluated with 15-7MHz and 17-5MHz US. All patients had correlative plain films.

Results
One-to-one comparison between cadaveric fingers and US scans showed the volar plates as homogeneously hyperechoic triangular structures attached to the base of the middle phalanx. Dynamic scanning during flexion and hyperextension of the joint was essential to assess their integrity. Three types of volar plate injuries were detected with US: detachment from the base of the middle phalanx without fracture (n=8); detachment with avulsion fracture (n=5) and intrasubstance rupture (n=2). When avulsion occurred without bony fracture, the detached volar plate migrated over the neck of the proximal phalanx.

Discussion
Dynamic US can reliably identify volar plate injuries in cases of mild displacement and in the absence of avulsion fractures.

Role of ultrasound guided drainage of hematoma in muscle strains. Personal experience.
Room "Beethoven" (Level 1) - Satuday June 10th, 2006 - 09:40

Dr. Leonardo Callegari; Dr.ssa Anna Leonardi; Dr. Amedeo Bini; Prof. Eugenio Genovese; Prof. Carlo Fugazzola (Italy)

Purpose / Introduction
Revising our patients series from 2001 to 2004, we found that residual fluid hematoma seen at US control exam 3 weeks after muscle strain was associated in approximately 50% of the cases with complications of this muscle strain (such as delayed repair, hypertofic scar, myositis ossificans, serous cyst). The aim of the study was to evaluate the utility of ultrasound guided drainage of residual hematomas after muscular strain in reducing the risk of muscle strain complications.

Materials and methods
During the period from 01-01-05 to 31-10-05 we selected 15 patients, examinated with US, with residual fluid hematoma 3 weeks after muscle strain. The hematomas were drained with ultrasound guided free hand technique using trocar needles 19-22 G.

Results
In all cases we obtained the complete aspiration of fluid with collaps of the cavity. All aspirations were uneventful. During follow-up with US examinations 40-60-90 days after trauma we observed 2 complications(13,3%): 1 myositis ossificans and 1 hypertrofic scar.

Discussion
The results of our study demonstrate that US guided drainage of hematomas is able to reduce complications of muscle strain. We propose this easy treatment as a step in therapeutic protocols of muscle strains.

Scientific Session 6
Chairs: V. Devos (Belgium) and M. Reiser (Germany)

Skeletal Hemangiomatosis – Evaluation of 15 new Cases
Room "Beethoven" (Level 1) - Satuday June 10th, 2006 - 10:30

Prof. Dr. med. Freyschmidt; Dr. med. Sternberg; Prof. Dr. med. Ostertag

Purpose / Introduction
To evaluate clinical and radiological signs of hemangiomatosis. Hemangiomatosis is grouped into 2 categories:
Patients with multiple primary hemangiomas
of bone with the same clinical, radiological and pathological features as solitary hemangiomas
Patients with diffuse skeletal and sometimes soft tissue hemangiomas with multiple osteolytic lesions of variable size, but with the same histology as solitary hemangiomas. ("Cystic" hemangiomatosis). But we believe that both groups represent the endstage of a continuum in the course of the disease.

Materials and methods
15 patients (5 males, 10 females; age range 15-62, mean
39 years) with histologically proven hemangiomatosis were investigated, regarding clinical symptoms, degree of skeletal involvement (number of involved bones vs.
disseminated disease), involvement of other organs, radiological (plain film, CT) appearance (lytic, sclerotic, mixed), signal changes in MRI(9 cases) and scintigraphic
pattern. In 4 cases a radiologic follow-up was possible. In 2 cases therapy with Thalidomid was performed.

Results
All patients had pain. Spleen involvement in 3, additional lung involvement in 1. 6 patients had disseminated disease, 9 multiple lesions. In 4 cases with multiple lesions the trunk was involved,

in 4 cases the appendicular skeleton (femur, tibia, tarsus, foot phalanges). 3 patients presented with lytic lesions exclusively around ancle and foot. In 4 patients with multiple lesions in the trunk 2 presented with predominantly lytic lesions, 1 showed sclerotic and 1 mixed lesions. 2 patients with disseminated disease had lytic, another sclerotic and 2 mixed lesions. In 1 patient with 8-year follow-up multiple lesions became fat, another case healed with sclerosis. In 2 cases with thalidomid therapy lesions healed also with sclerosis.

Discussion
In our study of 15 cases with skeletal hemangiomatosis we found a female predominance (10 f vs 5 m, mean age 30 y). At presentation the leading radiologic sign was osteolytic lesions (9/15), as well as in the group with multiple lesions as well as in the group with disseminated disease. Only three patients presented with mixed, and 3 with pure sclerotic lesions. All scintigraphic bone scans were positive except one case with fatty degeneration of the former histologically proven hemangiomas. MRI (9 cases) was unspecific with moderate to strong signal intensity of the lesions. Regarding the three follow – up cases and three cases with mixed lyic-sclerotic changes we conclude that the 2 main groups of hemangiomatosis (see introduction) may be part or end-stages of a continuum in the course of the disease. Thalidomid may accelerate the healing of the lesions.

POSTCHEMOTHERAPY EVALUATION OF EWING' S SARCOMA BY MR IMAGING: A MULTICENTRIC STUDY

Room "Beethoven" (Level 1) - Satuday June 10th, 2006 - 10:40

Drs Heyman S; Drs Van Herendael B; MD Stam M; MD Peersman B; MD Brys P; MD, PhD Verstraete KL; MD,PhD Vanhoenacker FM; MD,PhD Hogendoorn P; MD,PhD Bloem Johan; MD, PhD De Schepper AM (Belgium, The Netherlands)

Purpose / Introduction
The purpose of the study was threefold, firstly to describe the initial imaging-findings on radiography (or CT scan) and magnetic resonance imaging and to investigate their prognostic impact in a large series of patients with Ewing's sarcoma; secondly, to assess the results of induction chemotherapy by comparing tumor volume and enhancing tumor mass on pre- and postchemotherapy MR images and thirdly to compare response versus non-response on imaging studies and histopathological examination.

Materials and methods
The material originated from a multicentric study and consisted of 44 untreated patients with histologically proven Ewing's sarcoma. Findings on radiography (or CT scan) included location, distribution, matrix, margins, and type of periosteal reaction, and on MR images, size, margins, spread, percentage of osseous versus soft tissue component, signal intensity on different pulse sequences (at least T1-, T2- and T1- weighted images after contrast administration), presence of cystonecrotic areas, perilesional edema and findings on static and dynamic contrast studies (percentage of enhancing tissue), were scored on pre- and posttreatment examinations.

Results
On radiography (or CT scan) 20% of the lesions was purely lytic, 10% was permeative, 60% showed a combination of osteolysis and sclerosis whereas only a minority (3%) was purely sclerotic. The remaining 7% consisted of extraosseous Ewing's sarcomas. On prechemotherapy MR images mean diameters of the lesions were 98,5 x 59,9 x 57,9 mm, the mean percentage of osseous tumor component consisted of 41,3%. Eighty five % of the lesions showed marked, non-homogeneous enhancement after contrast administration. An enhancing area of more than 75% of tumor volume was noted in 83% of the patients. On postchemotherapy MR images mean diameters of the lesions were 69,3 x 37,3 x 38,4 mm. There was a decrease in volume in 72% and a decrease in enhancing tissue in 74%, and on radiography a bone remodeling in 65% of the patients. Response on histopathological examination correlated with findings on imaging in 80% of the cases.

Discussion
1.An imaging prototype of Ewing's sarcoma could be defined. 2.Initial presentation consisted of a bony lesion with extensive (>58%) soft tissue component, indicative for its aggressive biological behavior. 3.Response-scores on imaging and histopathological examination showed a correlation in 80% of the cases. 4.The remaining (20%) non-concordant results are a consequence of non

contribution of the changes in soft tissue components on histopathological response-grading and the inability to detect microscopic tumor residu on MR images. 5.A combined imaging-pathological approach in response grading should be considered.

OSTEOID OSTEOMAS AND BONE METASTASIS: OUR EXPERIENCE IN RADIOFREQUENCY ABLATION (RFA) TREATMENT

Room "Beethoven" (Level 1) - Satuday June 10th, 2006 - 10:50

MD Sophia Mylona; MD Evangelia Stroumpouli; MD Maria-Sofia Grammenou-Pomoni; MD Niki Lepida; MD Miltiadis Gravanis; Dr Loukas Thanos (Greece)

Purpose / Introduction
To present our experience in RFA of osteoid osteomas and metastatic osseous lesions.

Materials and methods
From July 2001 to December 2005 we treated 3 patients with osteoid osteomas and 35 patients with skeletal metastasis (28 from gastrointestinal tract carcinoma, 9 from lung carcinoma, 4 from breast, 1 from thyroid follicular and 1 from urinary bladder carcinoma)with RFA technique . We ablated the 3 primary lesions (2 tibia, 1 femoral) and 43 metastatic lesions (6 scapular, 15 iliac, 10 sacral, 9 costal and 3 lumbar) in 55 sessions. All procedures were performed under local anesthesia. Forty five minutes before the RFA all patients received an analgesic treatment for pain relief and better collaboration.
A RITA generator and a hooked electrode with 7 or 9 arrays were used. The mean ablation time was 20 minutes.

Results
We obtained total necrosis in all the osteoid osteomas lesions (100%) and in 38 (88%) metastatic lesions, and partial necrosis in 5 (12%) lesions. We detected peripheral sclerosis in 20 (46.5%) lesions. The 6 months follow-up revealed recurrence in 6 lesions (13.9%). We had no major complications. Twelve patients complained of mild pain during ablation. As these lesions provoke pain, all patients had before and after (for 4 weeks) RFA an interview with a Brief Pain Inventory. All patients had elimination of their pain symptoms. A total pain relief was obtained in the 3 patients with the osteoid osteomas.

Discussion
RFA is a minimally invasive, safe technique that can be used as an alternative treatment in osteoid osteomas and in osseous metastatic lesions with high effectiveness for pain control and giving amelioration of patient's life quality.

The healing pattern of osteoid osteomas on CT and MRI after thermocoagulation

Room "Beethoven" (Level 1) - Satuday June 10th, 2006 - 11:00

MD G. Vanderschueren; MD PhD J.L. Bloem; MD PhD W.R. Obermann; MD PhD A.R. van Erkel (Belgium, The Netherlands)

Purpose / Introduction
To compare the healing pattern of osteoid osteomas on computed tomography (CT) and magnetic resonance imaging (MRI) in patients with successfull and unsuccessfull thermocoagulation.

Materials and methods
- 86 patients were followed by CT scan (mean 14 months, range 2-32 months).
  A nidus was demonstrable in all cases before thermocoagulation. After thermocoagulation the healing or ossification of the nidus was evaluated according to five different healing patterns:
  1.complete ossification
  2.nearly complete ossification
  3.decrease in size
  4.unchanged size
  5.changed configuration (osteonecrosis)

- In 18 patients gadolinium-enhanced dynamic MRI was performed (mean 12 months, range 2-28 months).The delay time between arterial and nidal enhancement was studied before and after thermocoagulation. All cases demonstrated enhancement before thermocoagulation.

Results
CT follow-up:
Of 86 patients thermocoagulation was successful in 63 (73%) and unsuccessfull in 23 (27%):

CT healing of the nidus	Successful treatment (n=63)	Unsuccessful treatment (n=23)
Complete ossification	15 (24%)	0
Minimal nidus remnant	14 (22%)	0
Decreased diameter	16 (25%)	2 (9%)
Unchanged diameter	15 (24%)	21 (91%)
Thermonecrosis	3 (5%)	0

MRI follow-up:
Of 18 patients treatment was successful in 13 (72%) and unsuccesfull in five (28%):

MRI delay time before thermocoagulation (TC)	Successful treatment (n=13)	Unsuccessful treatment (n=5)
0-6 seconds	8	4
7-12 seconds	5	1
>12 seconds	0	0
Very slow enhancement (delay not measurable)	0	0
No enhancement	0	0

MRI delay time afterthermocoagulation (TC)	Successful treatment (n=13)	Unsuccessful treatment (n=5)
0-6 seconds	3	3
7-12 seconds	2	1
13-20 seconds	2	1
Very slow enhancement (delay not measurable)	1	0
No enhancement	5	0

Discussion
- Less than half of successfully treated patients(29/63 or 46 %) demonstrate complete or nearly complete ossification of the nidus. However in treatment failure patients this degree of ossification of the nidus was not identified.
- Persistent enhancement after thermocoagulation (MRI) was found both in successfully treated and treatment failure patients. Absence of enhancement was only seen in the successfully treated group (5/13 or 39 %).
- Further studies are necessary to draw any further conclusions, since mainly the MRI follow-up group contains a small number of patients.

Magnetic resonance imaging in dactylitis – what is the site of the inflammation?

Room "Beethoven" (Level 1) - Satuday June 10th, 2006 - 11:10

dr Clare Groves; dr M Chandramohan; dr Paul Healy; dr Philip Helliwell

Purpose / Introduction
To use magnetic resonance imaging in patients with psoriatic dactylitis to determine the imaging features of the disease prior to treatment.

Materials and methods
Fifteen patients with with recent-onset psoriatic dactylitis (11 toes, 4 fingers) were evaluated with a 1.5T machine, using a flexible shoulder coil with the field of view covering the whole of the affected hand or foot. T1W, fat suppressed T2W, and contrast enhanced sequences were acquired. Images were scored independantly by two observers experienced in musculoskelelatl radiology, who then reached consensus.

Results
In all 15 patients, there was multifocal joint involvement in addition to the clinically apparent dactylitic digit. The metacarpal/tarsal-phalangeal and proximal interphalangeal joints were most commonly affected. Intra- capsular fluid, synovitis and circumferential subcutaneous oedema were found in all involved digits.
Periarticular bone oedema was present in most cases, being maximal at the entheseal insertions. Erosions were found in approximately half of cases. Fluid within the flexor tendon sheaths was observed, but this was not present in all cases. However, inflammation of the adipose tissue between the tendons and the phalanges was common, predominantly on the flexor surface. In some cases, there was evidence for inflammation of the collateral ligaments, and plantar/volar plates. Sesamoiditis was seen in only one patient

Discussion
The MRI imaging features of psoriatic dactylitis exceed and out-weigh the clinical appearance, with abnormalities in affected and non-affected digits. Synovitis, intra-articular fluid, enthesitis, adipose tissue oedema and, to a lesser extent tenosynovitis, were seen in all cases

Subcutaneous epidermoid cyst : MR findings in four cases with characteristic debris on T2-weighted images

Room "Beethoven" (Level 1) - Satuday June 10th, 2006 - 11:20

Dr Meylaerts L.; Dr Brys P.; Dr Pans S.; Dr Samson I.; Prof Dr De Wever I. (Belgium)

Purpose / Introduction
To determine the MR imaging features of subcutaneous epidermoid cysts.

Materials and methods
MR images of four patients with a histologically proven subcutaneous epidermoid cyst were analyzed. The cysts were located in the calf, the knee, the buttock, and the foot-sole. Their size ranged from 2 to 5 cm. All lesions were examined with STIR or Fat-sat T2-weighted and T1-weighted images before and after IV-administration of Gd-DTPA.

Results
All lesions were well-circumscribed subcutaneous masses tethered to the skin. The signal pattern was heterogeneous on both STIR or FS T2-WI and on T1-WI. On STIR or FS T2-WI images they were grossly hyperintense, admixed with curvilinear or amorphous hypointense areas. On T1-WI two lesions were isointense and two slightly hyperintense to muscle, all four admixed with some hypointense and three also with slightly hyperintense foci. Three lesions showed absence of any contrast enhancement. The fourth case showed peripheral enhancement.

Discussion
Simple fluid cysts are characterized by a homogeneous signal, hypointense to muscle on T1-WI, hyperintense on T2-WI, and a thin rim of Gd-enhancement. Epidermoid cysts have MR-characteristics

different from simple fluid cysts, depending on the chemical composition of cholesterol and keratin. Intracystic keratin debris was demonstrated on T2-WI in all lesions, varying from curvilinear or amorphous foci to clusters of hypointense material. A high lipid concentration is responsible for the increased signal intensity on T1-WI, slightly hyperintense or isointense to muscle. On T1-WI three lesions also showed some hyperintense foci, probably consistent with lipid aggregates. Keratin debris is most likely to be responsible for the hypointense foci and heterogeneous signal pattern on T1-WI. Consistent with its cystic nature, three lesions didn't show any Gd-uptake. In one case previous rupture of the cyst wall with extrusion of some keratin into the dermis caused secondary inflammation and a foreign body-type reaction, responsible for the peripheral Gd-enhancement. Well-known as a clinical feature epidermoid cysts usually are tethered to the epidermis. On MRI they are broadly adherent to the skin without a separating fat plane.

Conclusion
A well-circumscribed subcutaneous lesion, tethered to the skin, showing a signal intensity iso- or hyperintense to muscle on T1-WI, a heterogeneous signal intensity on both T1- and T2-WI, hypointense debris on T2-WI, and absent or eventually peripheral Gd-enhancement, most likely is an epidermoid cyst.

Pre- operative accuracy of CT Guided Biopsy in the Assessment of Musculoskeletal Tumours

Room "Beethoven" (Level 1) - Satuday June 10th, 2006 - 11:30

Dr Stephen Schlicht; Dr Peter Smith; Dr John Slavin; Dr Guilio Comin; Prof Peter Choong; Mr Gerard Powell; Dr Shalini Amukotuwa (Australia)

Purpose / Introduction
Accurate pre- operative diagnosis of musculoskeletal soft tissue and bone tumours is critical. Traditionally open biopsy has been performed to obtain a tissue diagnosis but now image guided closed techniques are becoming more popular. Reported accuracy rates however vary widely and have been historically based on small series.

Materials and methods
680 patients with primary bone or soft tissue musculoskeletal tumours who underwent percutaneous biopsy over a five year period were reviewed. 366 patients subsequenty had definitive surgical excisions following the initial biopsy while the remaining 314 were followed clinically and radiologically for at least 12 months. The percutaneous biopsy result was compared with the definitive surgical specimens and clinico-radiological follow-up in the latter group.

Results
Histopathology of the pre-operative biopsy was compared with that of the surgical specimen and deemed accurate if both results were the same for tumour grade ie. benign or malignant and tumour type. In addition percutaneous biopsy was deemed "effective" if they correctly distinguished between benign and malignant tumours. Of 366 patients who underwent surgical excision 299 (81.3%) were accurate, with percutaneous biopsy effective in a further 46 patients giving an overall accuracy of 94.3 % There were 21 non diagnostic biopsies 3.1%. No complications were reported from percutaneous biopsy.

Discussion
Pre-operative percutaneous biopsy is an accurate, safe and cost effective technique in the evaluation of musculoskeletal tumours. Such patients need to be ideally evaluated and managed in specialised units offering a multi-disciplinary approach to diagnosis and treatment options.

MRI Detection of Vascular Encasement by Soft Tissue Tumours and its Relevance in Differential Diagnosis.

Room "Beethoven" (Level 1) - Satuday June 10th, 2006 - 11:40

Dr. F Alyas; Dr. J Lee; Dr. M Ahmed; Miss K. Ali; Dr. D Connell; Dr. A Saifuddin (United Kingdom)

Purpose / Introduction
To determine the prevalence of vascular encasement by soft tissue masses as identified by MRI and whether this finding differentiates benign form malignant neoplasms.

Materials and methods
494 patients (268 female and 290 males, mean age 47.5 years+/-19.9[S.D.]) presenting with a deep soft tissue mass over a 7-year period were included. All patients underwent MRI and histological diagnosis on biopsy/surgical resection to determine if the lesion was non-neoplastic, neoplastic benign or neoplastic malignant. These patients were further divided into two groups: Group 1- partial/complete encasement and Group 2- no encasement of the neurovascular bundle (soft tissue mass displaced, contacted or did not involve vessels).

Results
62/494 (12.6%) patients had vascular encasement on MRI. Of the 62 patients in Group1 – 5 (8.1%) were non-neoplastic, 14(22.6%) had benign neoplasms and 43 (69.4%) had malignant neoplasms. Of the 432 Group 2 patients - 77(17.8%) had non-neoplastic lesions, 155 (35.9%) had benign neoplasms and 200 (46.3%) had malignant neoplasms. Malignant neoplasms were 2.1x and 2.9x more likely to be associated with vascular encasement compared to the benign neoplasms and non-neoplastic lesions respectively. Benign neoplasms were 1.4x more likely to be associated with vascular encasement than non-neoplastic lesions.

Discussion
The prevalence of vascular encasement by soft tissue tumours on MRI is 12.6%. There is a statistically significant difference in the prevalence of vascular encasement between malignant neoplasms and both benign neoplasms and non-neoplastic lesions ($p<0.05$).

EPOS™

General Information

EPOS™ Posters can be viewed in the EPOS™ Room at the second floor of the congress building. The EPOS™ Room is opened on Friday from 10h00 till 17h00 and on Saturday from 9h00 till 16h00.
Besides online viewing the posters, there is also the option to send the posters of your choice to your personal email address for later reference.

The organising committee thanks the members of the scientific committee for reviewing and rating the abstract submissions and awarding certificates of Merit, Cum Laude and Magna Cum Laude.

EPOS™ Posters

The following electronic posters were submitted for this congress.

Awarded with "Magna Cum Laude"

CT-scan based analysis of cemented femoral hip implants. State of the art and future perspectives.
T. Scheerlinck, F. Michels, P. Vandenbussche, J. de Mey, R. Deklerck; /BE

Reduction of absorbed dose by adaptation of exposure factors in digital radiography
H. Wiltz, U. Petersen, B. Axelsson; Växjö/SE

Awarded with "Cum Laude"

Atlanto-axial osteoarthritis: two distinct radiological patterns
E. LLopis[1], V. Higueras Guerrero[2], P.F. Ripolles[2], P.T. Larraz[2], J. Piquer[2]; [1]Valencia/ES, [2]Alzira/ES

Dynamic contrast-enhanced MR imaging of enchondromas and low grade chondrosarcomas
S. Dekeyzer, K.L. Verstraete; Gent/BE

Hypothenar hammer syndrome : imaging findings in 28 cases.
J. ZABEL, F. Dap, A. Blum; Nancy/FR

Interventional procedures in hand and wrist under ultrasound guidance
M. Vlychou, K. Mukherjee, J. Teh; Oxford/GB

Unveiling the "unique bone": A study of the differential diagnosis of clavicular lesions based on age and distribution.
S. Suresh[1], K. Ali[2], A. Saifuddin[1]; [1]Stanmore/GB, [2]Stanmore, Middlesex/GB

US demonstration of the Brachial Plexus
M. Cresswell, E. McNally; Oxford/GB

Awarded with "Certificate of Merit"

Assessment of suspected bone marrow pathology with quantitative diffusion MR imaging.
T. Gerukis, A. Fotiadou, E. Vafeiadis, K. Anastasiadou, M. Pilavaki, A. Petridis, V. Kalpakidis, P. Palladas; Thessaloniki/GR

CTarthrography of the knee in osteochondritis dissecans patients. Comparison of 0.5mm, 1mm, 3mm reformatted slices.
K. Pikoulas, G. Giannikouris, I. Staikidou, G. Mantzikopoulos; Athens/GR

Early rheumatoid arthritis: a pictorial review with special emphasis on MR and US findings
N. Boutry, M. Morel, C. Musielak, R. Flipo, X. Demondion, A. Cotten; Lille/FR

Intra-articular injection of contrast medium for MR and CT arthrography: US vs fluoroscopic guidance for wrist , ankle and elbow
P. Simoni, M. Martina Francesca, A. Ruggiero, C. Di Capua, E. Faiella, C. Quattrocchi, B. Beomonte Zobel; Rome/IT

MRI approach to study of metatarsalgia
R. Dominguez-Oronoz, O. Persiva, X. Merino-Casabiel, V. Pineda-Sanchez, S. Gispert-Herrero; Barcelona/ES

MRI of injuries of the posteromedial corner of the knee - a pictorial review
G. Thompson[1], M. Taylor[1], D. Connell[2], A. Saifuddin[2], C. House[1]; [1]London/GB, [2]Middlesex/GB

Patellar Complications following Total or Partial Knee Arthroplasty
P. Melloni, R. Valls, S. Pereza, J. Prieto, I. Delgado, A. Martín; Sabadell/ES

The Abdominal Wall and Its Zones of Weakness: A Sonographic-Anatomic Study
X. Demondion, M. Jaspart, J. Brasseur, N. Boutry, M. Morel, A. Cotten; Lille/FR

Other Submitted Posters

Sonography after total hip replacement: reproducibility and normal values in 47 clinically uncomplicated cases
E.M. Hoefnagels, M. Obradov, M. Reijnierse, P.G. Anderson, B.A. Swierstra

Superiority of early MRI in plain film normal wrist injuries
R. SINHA, F.W. SMITH-ABERDEEN; Aberdeen/GB

Lipoma Arborescens (Villous Lipomatous Proliferation of the Synovial Membrane): Case report
M.C. Gallo, R. Moricca, A. Taccone; La Spezia/IT

Synovial Osteochondromatosis, Primary versus Secondary
M.C. Gallo, R. Moricca, A. Taccone; La Spezia/IT

Enchondroma and low grade chondrosarcoma. Radiographic distinction is possible?
E. Muraro[1], F. De Bei[1], M. Natrella[2], T. Meloni[1]; [1]Aosta/IT, [2]Turin/IT

Systemic sclerosis : revisited
N. Boutry, E. Hachulla, C. Musielak, M. Morel, X. Demondion, A. Cotten; Lille/FR

The value of postmeniscectomy MRI : "deception or direction?"
P. D'Hooghe[1], B. Vandekerckhove[2]; [1]Brugge/BE, [2]Pellenberg/BE

Fast MRI: a news protocol to detect occult fractures
E. Muraro[1], F. De Bei[1], D. FURFARO[1], G. FANELLI[1], M. Natrella[2], T. Meloni[1]; [1]Aosta/IT, [2]Turin/IT

Lumbar Spine Radiography in acute and persistent Low back pain.
J. Singh, H. Khan, R. Miller, B. Summers

Incidence of chronic knee lesions in long-distance runners in correlation with the training level: Findings at MRI.
C. Schueller-Weidekamm, G. Schueller, M. Uffmann, F. Kainberger, T. Bader; /AT

Anatomic, Sonographic and MR Imaging of the ankle retinacula
X. Demondion, J. Brasseur, D. Zeitoun, N. Boutry, P. Grenier, A. Cotten; Lille/FR

Imaging diagnosis of Tethered Spinal Cord in Children with Spinal Dysraphism
F. Akhmedjanov, E. Grigorieva; /RU

The value of power doppler ultrasonography for assesment of synovial vascularity: compared with contrast MRI
G. Labanauskaite-Sliumbiene; Kaunas/LT

MR imaging of soft tissue masses: the relationship of lesion size, depth and diagnosis
A. Datir, S. James, K. Ali, J. Lee, M. Ahmad, A. Saifuddin; /GB

Shoulder Impingement Syndrome: Prospective Comparison of MR Imaging with Sonography
K. Demet, K. Ali Sami, R. Haykir; Konya/TR

Craniofacial Fibrous Dysplasia
K. Demet, A. Karabacakoglu; Konya/TR

Parry-Romberg syndrome with contralateral low extremity, and ipsilateral salivary gland involvement
K. Demet, K. Serdar, K. Mustafa; Konya/TR

Comparison of ultrasonography with magnetic resonance imaging in the diagnosis of disk displacement of the temporomandibular joint: a preliminary study
K. Demet, K. Ali Sami; Konya/TR

Posttraumatic injury of upper cervical spine (C1-C2) in computed tomography, radiological-clinical correlation.
A. Siemianowicz, W. Wawrzynek, S. Kasprowska, R. Majer, A. Koczy, M. Trzepaczynski, B. Koczy, J. Widuchowski; /PL

Extraspinal musculoskeletal tuberculosis: MR imaging features
L. Jans[1], A. De Backer[1], K.L. Verstraete[1], K. Mortelé[2], F. Vanhoenacker[3], P.M. Parizel[3]; [1]Gent/BE, [2]/BE, [3]Antwerp/BE

MRI Evaluation the Hindfoot of Patients with Spondyloarthritides: Comparison of Low-Field and High-Field Strength Units
I. Eshed, C. Althoff, E. Feist, K. Minden, B. Hamm, K.G. Hermann; Berlin/DE

Evidence based practice in the utilization of knee radiographs - A survey of all members of British Orthopaedic Association.
S. Bhatnagar, P. Bhatnagar, C. Darrah, M. Glasgow

Angiographic findings of late hemarthrosis after total joint arthroplasty.
E. Dhondt[1], A. Snoeckx[1], O. d'Archambeau[1], L. Defreyne[1], F. Vanhoenacker[2]; [1]/BE, [2]Antwerp/BE

Role of bone scintigraphy in sports related injuries
D.S. Kumar, C. Ramesh, R.K. Gurajala, S. Vinjamuri; Liverpool/GB

Multidisciplinary Team meeting for Sarcoma: Are we up to the mark?
N. Vishwanath, M. Vishwanath, R. Whitehouse; Manchester/GB

Musculoskeletal MRI in Obesity
S. Blease; /GB

The value of decision rules in acute knee injuries
A. Abdellaoui, E. Bayton; /GB

MR shoulder arthrograms: A teaching hospital experience of 5 years
N. Vishwanath, F. Bayam, J. Jenkins; Manchester/GB

Multimodality Imaging of Spondylolysis
A. Leone, A.M. Costantini, M. Cirillo, L. Bonomo; /IT

Percutaneous Discectomy - Clinical experience and results
A.D. Kelekis[1], D.K. Filippiadis[1], A.L. Kelekis[2], A. Nikita[1], E. Brountzos[1], O. Papakonstantinou[3], A. Gouliamos[1]; [1]Athens/GR, [2]Thessaloniki/GR, [3]Iraklion/GR

Glenohumeral tuberculous arthritis as a result of incomplete antitubercular therapy
M.S. Sidiropoulou, T.L. Giannopoulos; Litohoro/GR

Use of Gel foam Embolisation during Vertebroplasty reduces the incidence of cement leak
N. Malay, C. Bhatia, M. Krishna, R. Pollock; Stockton On Tees/GB

Role of tendon position during doppler sonography for neovascular tendinopathy
J.M. Farrant, P.J. O'Connor, A.J. Grainger; Leeds/GB

Neurogenic muscle hypertrophy : imaging features in three cases and review of the literature
J. ZABEL[1], T. Batch[1], J. Lecocq[2], A. Blum[1]; [1]Nancy/FR, [2]Strasbourg/FR

Ultrasound guided core biopsy of soft tissue tumours: characteristic imaging findings related to diagnosis
S. Jaffe[1], G.M. Allen[1]; [1]Birmingham/GB

Ultrasound guided core biopsy of soft tissue tumours: characteristic imaging findings related to diagnosis
S. Jaffe[1], G.M. Allen[1]; [1]Birmingham/GB

Spinal Tuberculosis: a longitudinal study with clinical, biological and imaging outcome
A. Feydy, L. Le Page, V. Zarrouk, B. Fantin, J. Drapé, A. Chevrot; /FR

Imaging does not predict the clinical outcome of bacterial vertebral osteomyelitis
A. Feydy, V. Zarrouk, F. Sallès, B. Fantin, J. Drapé, A. Chevrot; /FR

Delayed Cervical Traumatic Injury
J. Toman, A. Platon, A. Reverdin, P.A. Poletti; Geneva/CH

MRI Findings of Rare Soft Tissue Tumors: A medley of interesting cases
M. Argin, R. Arkun, A. Oktay, T. Akalin; Izmir/TR

Vertebroplasty and its outcome
N. Malay, C.K. Bhatia, M. Krishna, R. Pollock; Stockton On Tees/GB

Skeletal tuberculosis revisited
R. SINHA; Aberdeen/GB

Guidelines for Belgian MR centers for monitoring of bone marrow involvement in patients with Gaucher's disease
F. Vanhoenacker[1], M. Maas[2], K.L. Verstraete[3], M. Shahabpour[4]; [1]Antwerp/BE, [2]Amsterdam/NL, [3]Ghent/BE, [4]Brussels/BE

DEXA measurement of bone mass and soft tissue composition in spinal cord injury
A. Dimitrakopoulos[1], O. Lazoura[1], E. Antoniadou[1], S. Stathopoulou[1], K. Tsilikas[1], V. Antoniou[1], P.J. Papadaki[1], G. Zavras[1], M. Vlychou[2], N. Groumas[1]; [1]Athens/GR, [2]Larissa/GR

DEXA evaluation of bone density in hemiparesis. Paretic vs. normal hip. Preliminary study.
O. Lazoura[1], M. Vlychou[2], E. Antoniadou[1], S. Stathopoulou[1], K. Tsilikas[1], A. Vassiou[2], P.J. Papadaki[1], N. Groumas[1], A. Papadimitriou[2], I. Fezoulidis[2]; [1]Athens/GR, [2]Larissa/GR

Scheuermann's Disease - Classical or Lumbar, - a radiological diagnosis causing confusion
B. Summers, J. Singh, R. Manns; Telford, Shropshire/GB

Backache in children and adolescents - A pictorial review
D.S. Kumar[1], S. Ramamurthy[2], S. Avula[1], C. Landes[1], U. Hughes[1]; [1]Liverpool/GB, [2]Wirral/GB

Magnetic Resonance Imaging findings in Ewing?s sarcoma & osteomyelitis
N. Bermejo[1], X. Azores[2], G.D. Guerediaga[3], S. Beltrán de Otalora[4], L. Oleaga[1], L. Arizaga[2], D. Grande[1]; [1]Bilbao/ES, [2]Baracaldo/ES, [3]Viseu/PT, [4]Vitoria/ES

Magnetic resonance imaging findings of gnathostomiasis, an emerging imported disease
X. TOMAS[1], N. RUSCALLEDA[1], A. MOLL[2], J. GASCON[1], P. LUBURICH[1], A.I. GARCIA DIEZ[1], J. POMES[1]; [1]Barcelona/ES, [2]Palma De Mallorca/ES

Malignant Fibrous Histiocytoma Magnetic Resonance Imaging staging
N. Bermejo[1], X. Azores[2], L. Oleaga[1], L. Arizaga[2], D. Grande[1]; [1]Bilbao/ES, [2]Baracaldo/ES

Evaluation of patellar cartilage with 3D/WATS/C3f MR Imaging
K. Ulusoy, A. Yucel, G. Maralcan, Y. Aksoy; Afyon/TR

Posttraumatic bone marrow edema
B. Drugová, R. Druga; Prague/CZ

Oncogenic Osteomalacia Due to a Mesenchymal Tumour Revealed by Indium-111-labeled Octreotide Scanning
C. Georganas, G. Delimpasis, K. Revelos, D. Pappas; Athens/GR

Evolution of magnetic resonance bone findings in Erdheim-Chester disease
R.M. García-Barredo, E. Gallardo, A. Garcia; Cantabria/ES

Imaging of hyperparathyroidism - A pictorial review
S.R. Bathina, M. Bhojak, I.G. Hide; Newcastle Upon Tyne/GB

MR imaging of ankle sprain : kinetic chain injury analysis to optimize scan protocol
P. Simoni, M. Martina Francesca, P. Cimini, E. Leo, V. Valentini, C. Quattrocchi, M. Sammarra, B. Beomonte Zobel; Rome/IT

MRI findings of Soft Tissue Metastases
S. Hussain, G.M. Allen; Birmingham/GB

Preoperative assessment of hamstring size in ACL reconstruction using ultrasound.
C. Groves, S. Bollan, B. Varghese; Bradford/GB

Imaging of Musculoskeletal Manifestations of Neurofibromatosis 1
A. Snoeckx[1], F. Vanhoenacker[1], C. van Rijswijck[2], A. De Schepper[2], P.M. Parizel[1], J. Bloem[2], M. Miller[3]; [1]Antwerp/BE, [2]Leiden/NL, [3]Auckland/NZ

Role of VR and MPR images in patients with fractures of the axial skeleton
E. GÓMEZ, M. ISUSI, L. OLEAGA, D. GRANDE; Bilbao/ES

Muscle edema: a sign of a spectrum of pathologies
E. GÓMEZ, L. OLEAGA, M. ISUSI, M. GORRIÑO, D. GRANDE; Bilbao/ES

Hand injuries of Basque pelota players: MRI findings
F. Idoate, J. Urrutia, T. Fernández-Villa, P.L. Alejandre, M.E. Iglesias; Pamplona/ES

Conventional Osteosarcoma and its variants - A pictorial review
S.R. Bathina, P. Dildey, I.G. Hide; Newcastle Upon Tyne/GB

Giant cell reparative granuloma - A rare cause of expansile multi-loculated defect of skull bones: case presentation and review of literature.
S.R. Bathina, D. Birchall, I.G. Hide; Newcastle Upon Tyne/GB

Imaging of Paediatric Foot lesions- A Pictorial Review
P. Rajiah, A. Shabani; Manchester/GB

Imaging the calcaneum - a pictorial review
P. Rajiah, A. Shabani; Manchester/GB

Evaluation of Anterior Cruciate Ligament (ACL) Reconstruction with Magnetic Resonance Imaging (MRI)
A. Duarte[1], J. Kim[2], K. Chow[2], K. Motamedi[2], L.L. Seeger[2]; [1]Lisboa/PT, [2]Los Angeles/US

Detection of sacroiliitis in patients with Crohn?s disease using MRI: Preliminary results.
G. Delimpasis, A. Gyftopoulos, E. Protopapa, M. Malamas; Athens/GR

The use of Whole body MRI for body fat assessment and comparison with serum leptin concentration.
J. O'Brien, D. Brennan, P. Whelan, K. Robinson, O. Ghita, S. Eustace; Dublin/IE

Myositis ossificans in children- Pictorial Review of Interesting cases
P. Rajiah, A. Shabani; Manchester/GB

A Comparison Between Whole Body MRI (WBMRI) and Skeletal Survey In the Staging of Multiple Myeloma
T. Gleeson, J. McHugh, P. O'Gorman, S. Eustace; Dublin/IE

Improved MR image contrast resolution of gadolinium contrast medium using VIBE in MR arthrography of the shoulder joint.
P. Grouwels[1], J. Vandevenne[1], D. Valkenborg[2], Y. Palmers[1]; [1]Genk/BE, [2]Diepenbeek/BE

To Image or not to Image!!!-Should Radiologists routinely scan the SI Joint for Backpain patients?
V. Shanbhag, A. Ghandour, K. Lyons, A. Jones, J. Howes, P.R. Davies, S. Ahuja; Cardiff/GB

Imaging Overuse Sports Injuries Of The Knee
J.M. Farrant, P. Robinson, P.J. O'Connor, A.J. Grainger; Leeds/GB

MR imaging evaluation of the postoperative anterior cruciate ligament
I. Tsifountoudis, I. Kalaitzoglou, A.S. Dimitriadis; Thessaloniki/GR

Pseudoarthrosis of tubular bones in patients with neurofibromatosis. Two rare manifestations evaluated by MRI.
M.B. Hellfritzsch, A.G. Jurik; Aarhus/DK

Cyclops lesion as a complication of anterior cruciate ligament reconstruction: MRI, arthroscopic and histopathologic findings in 3 cases.
I. Tsifountoudis, I. Kalaitzoglou, G. Karkavelas, C. Lazaridis, K. Voukalis, A.S. Dimitriadis; Thessaloniki/GR

MRI following the semitendinosus and gracilis tendons harvest for anterior cruciate ligament reconstruction
I. Tsifountoudis, I. Kalaitzoglou, S. Papastergiou, A. Drevelegas, G. Petsatodis, A.S. Dimitriadis; Thessaloniki/GR

Proximal Focal Femoral Deficiency
J. Brtkova[1], I. Krotka[2], J. Charvát[1]; [1]Hradec Kralove/CZ, [2]Prague/CZ

How often multiple myeloma can involve posterior element of the spine?
J. Park[1], S.K. Kim[1], K. Lee[2], W.H. Jee[1]; [1]Seoul/KR, [2]Anyang/KR

MR imaging of Intraarticular Ganglia of the knee joint:Emphasis on location and related internal derangement.

K. Lee[1], J. Park[2], J. Eun Choi[2]; [1]Anyang/KR, [2]Seoul/KR

Can MR help in the diagnosis of myxoid liposarcoma?
S. Ortori[1], V. Zampa[1], C. Iacconi[1], E. Ceretti[2], C. Bartolozzi[1]; [1]Pisa/IT, [2]Forte Dei Marmi/IT

An MR protocol for assessment of post-operative infection in oxidized zirconium knee arthroplasty.
R. Hodgson, R. Campbell, C. Jakaraddi, J. Davidson, J. Davies; Liverpool/GB

MDCT arthrography - Pictorial review
J.S. Sawhney, K. Jeyapalan; Leicester/GB

Do MEDIC or DESS sequences add diagnostic information to routine imaging of the knee at 3T.
R. Hodgson, S. Desmond, A. Lipton; Liverpool/GB

Image Guided Therapeutic Interventions In Cystic Lesions of the Knee.
I. Mwangi, P. MacMahon, M. Shelly, S. Eustace; Dublin/IE

Prevalence and Diagnostic Significance of Fluid/Fluid Levels in Soft Tissue Neoplasms.
F. Alyas, J. Lee, M. Ahmed, K. Ali, D. Connell, A. Saifuddin; London/GB

Necrotizing fasciitis coexistent with pyomyositis
M. Natsika, E. Panourgias, C. Kalamara, D. Schizas, G. Kotoulas; Athens/GR

Multiple Myeloma: what have the radiologists to know about current aspects of clinical and imaging diagnostics?
A.I. García, X. Tomás, J. POMES, X. Setoain, A. López, S. Capurro; Barcelona/ES

CT-guided Trephine bone biopsy in infectious disease. how accurate is it?
S. Mylona, L. Thanos, E. Stroumpouli, M. Gravanis, N. Ptohis, N. Batakis; Athens/GR

Patients with known primary neoplasm presenting osseous lesions: is bone biopsy under CT guidance effective in diagnosis?
S. Mylona, E. Stroumpouli, L. Thanos, N. Lepida, C. Goudou, N. Batakis; Athens/GR

Value of panoramic US in evaluation of musculoskeletal lesions
H. Yerli, E. Geyik, N. Tutar, I. Isiklar; Ankara/TR

Bone metastases in breast cancer: higher prevalence of osteoblastic lesions
C. Quattrocchi, P. Simoni, M. Martina Francesca, S. Piciucchi, M. Sammarra, B. Beomonte Zobel; Rome/IT

Bilateral Elastofibroma Dorsi: A Pathognomonic Radiological Features
R. Haykir, S. Karakose, A. Karabacakoglu; Konya/TR

MRI findings of Prepatellar and Olecranon Septic Bursitis
R. Haykir, S. Karakose, N. Karalezli, A. Karabacakoglu; Konya/TR

High grade surface osteosarcoma-chondroblastic type - case report
V. Vasilevska, G. Zafiroski, A. Poposka, N. Kirjas, V. Tolevska, D. Krstik, O. Muratovska; Skopje/MK

Thoracic three-dimensional spiral CT findings of Spondylocostal dysostosis
R. Haykir, S. Karakose, A. Karabacakoglu, S. Kapicioglu; Konya/TR

Infiltrative therapy of subacromial (SA) bursa: a new technique
L. Sconfienza[1], E. Silvestri[2], D. Schettini[1], A. Muda[1], M. Falchi[1], G. Garlaschi[1]; [1]Genova/IT, [2]Genoa/IT

Radiographic manifestations of musculoskeletal lymphoma: A pictorial review
S. McDermott, A.A. Alhajeri, D. McKenna, P.A. McCarthy; Galway/IE

Ultrasound of the Spring ligament complex. Findings in Healthy Volunteers and Patients with Posterior Tibial Tendinopathy
R. Mansour, S. Ostlere, R. Sharp, J. Teh; Oxford/GB

US, Colordoppler US, Contrast Enhanced US, CT and MRI in Peripheral Nerve Tumors
F. Sandomenico, O. Catalano, A. Petrillo, M.M. Raso, A. Siani; Naples/IT

Bone density measurements and musculoskeletal interactions in female uremic patients with high-turnover renal osteodystrophy: assessment by peripheral Quantitative Computed Tomography (pQCT).
A. Balanika[1], O. Papakonstantinou[2], G. Skarantavos[1], C. Baltas[1], N. Kelekis[1], D. Vlachakos[1], A. Gouliamos[1]; [1]Athens/GR, [2]Iraklion/GR

Measurement of scoliosis sagital profile and its value in assessment of surgical treatment results
M. Ke?kovský, A. ?prláková, J. Neubauer, M. Repko, R. Chaloupka; [1]Brno/CZ

Sonographic appearance of abdominal wall disorders in childhood
M. Vakaki, G. Pitsoulakis, P. Antonopoulou, C. Koumanidou; Athens/GR

Radiologic-pathologic correlations in soft tissue lipomatous tumours of the extremity
F. Sandomenico, F. Fazioli, O. Ctalano, A. Petrillo, S.V. Setola, A. Siani; Naples/IT

Calvarial epidermoid cysts in young children: sonographic features
M. Vakaki, M. Papadaki, P. Antonopoulou, P. Papadoniou, G. Pitsoulakis, C. Koumanidou; Athens/GR

Peritendinous lesions in the extremities of children: sonographic evaluation
M. Vakaki, G. Pitsoulakis, E. Karamanoli, C. Koumanidou; Athens/GR

Musculoskeletal infections in children: the role of sonography
M. Vakaki, M. Papadaki, E. Halatsi, E. Karamanoli, G. Pitsoulakis, C. Koumanidou; Athens/GR

Focal soft-tissue swelling of the head in pediatric patients: sonographic imaging
M. Vakaki, G. Pitsoulakis, P. Papadoniou, E. Halatsi, A. Hountala, C. Koumanidou; Athens/GR

Dynamic contrast-enhanced MRI for postoperative follow-up and detection of recurrence of giant cell tumor of bone
V. VandeVyver, K.L. Verstraete; Gent/BE

Clinically Significant Cases of Knee Pathology: A Pictorial Essay of MR Imaging Findings
M. Tzalonikou, Z. Athanasopoulou, E. Kamarioti, A. Tsoutsanis, G. Karachalios, K. Stringaris; Athens/GR

Degenerative Disk Disease of the Lumbar Spine and MRI: Spectrum of Findings
M. Tzalonikou, E. Kamarioti, M. Chatzopoulou, D. Antoniou, I. Vlachos, K. Stringaris; Athens/GR

Real time contrast enhanced ultrasonography in evaluation of soft tissue tumors
F. Sandomenico, M.M. Raso, O. Catalano, A. Petrillo, F. Fazioli, A. Siani; Naples/IT

Ultrasound in ankle trauma; a pictorial review
N. Vishwanath[1], M. Vishwanath[2], S.H.M. Khan[2]; [1]Manchester/GB, [2]Blackburn/GB

Arachnoiditis-like changes due to chronic degenerative disk disease of the lumbar spine and spinal stenosis: case report
M. Tzalonikou, E. Kamarioti, D. Antoniou, K. Stingaris; Athens/GR

64 MSCT in skeletal trauma: personal experience.
A. Leonardi, L. Callegari, E. Genovese, A. Bini, C. Fugazzola; Varese/IT

Aggressive osteoblastoma of the rib: A case report.
M. Tzalonikou, M. Chatzopoulou, T. Dosios, C. Pittaros, Z. Athanasopoulou, K. Stringaris; Athens/GR

Xanthomas of the patellar tendon: US and MRI findings in a patient with Familial Hypercholesterolemia
R. Haykir, S. Karakose, A. Karabacakoglu; Konya/TR

DGH experience of percutaneous vertebroplasty reveals its new role in management of vertebral compression fracture
T. Sikdar, N. Taha, D. Dutta, A. Hussein; Harlow/GB

MRI of paediatric soft tissue tumours - a pictorial review
P. Rajiah, A. Shabani; Manchester/GB

Is 'age less than 20' a useful red flag sign in low back pain?
K. Mukherjee, E. Buchanan, L. Thompson, S. Ostlere; Oxford/GB

Variations in the MRI appearance of Pars Defect - A pictorial review.
K. Mukherjee, S. Ostlere; Oxford/GB

Unicompartmental Knee Arthroplasty - a pictorial review.
K. Mukherjee, H. Pandit, E. McNally, D.W. Murray, S. Ostlere; Oxford/GB

Imaging spectrum of histiocytosis
P. Rajiah, A. Shabani; Manchester/GB

Soft tissue infections - pictorial review of common and uncommon cases
P. Rajiah, A. Shabani; Manchester/GB

Imaging of mucopolysaccharidoses and their complications - a pictorial review
P. Rajiah, A.G. Shabani; Manchester/GB

The posterior aspect of the knee: Normal anatomy and pathological findings
M. Vlychou, R. Mansour, E. McNally; Oxford/GB

Full-thickness rotator cuff tears: evaluation with ultrasonography and magnetic resonance imaging. A prospective study
A. Fotiadou[1], Z. Dailiana[2], P. Papadopoulos[1], M. Vlychou[2], I. Fezoulidis[2], K. Malizos[2], T. Karahalios[2], E. Vafiadis[1]; [1]Thessaloniki/GR, [2]Larissa/GR

Clinical and MRI outcome of bone marrow edema and subchondral lesions of the knee after oral treatment with Iloprost or Tramadol
M.E. Mayerhoefer[1], J. Kramer[2], C. Norden[3], A. Vakil-Adli[2], R. Meizer[1], H. Siedentop[3], N. Aigner[1], M. Breitenseher[4]; [1]Vienna/AT, [2]Linz/AT, [3]Berlin/DE, [4]Horn/AT

Gluteal compartment syndrome unrelated to fractures - early CT findings
A.P. Parkar, G. Jenssen; Bergen/NO

MRI of calcaneal insufficiency fractures in diabetics
A. Rigopoulou, R. Mansour, J. Teh; Oxford/GB

The value of MDCT in evaluating benign osteochondromas
H.T. SANAL, N. BULAKBASI, D. YILDIRIM, M. KOCAOGLU, I. GUVENC, F. ORS; Ankara/TR

Management of multiple level discitis
I. Alcelik, C.K. Bhatia, R. Pollock, K. Lingutla, M. Krishna; Stockton On Tees/GB

MRI in long term evaluation of reconstructed hind-feet of land-mine trauma patients
H.T. SANAL, N. BULAKBASI, M. KOCAOGLU, D. YILDIRIM, I. GUVENC; Ankara/TR

Melting wain the joint - cases of intra-articular extension of melorheostosis.
S. Suresh, T. Kumar, T. Briggs, A. Saifuddin; Stanmore/GB

The Utilisation of Multiplanar Reconstruction in Detecting Vertebral Abnormalities on Abdominal Multidetector CT Scan
H. Obaid, Z.H. Aldin, R. Bhatt; Leicester/GB

Adverse Features of Orthopaedic Hardware: Pictorial Review
H. Obaid, P. Vlachou, D. Finlay; Leicester/GB

Imaging of painful ankles after lateral ligament reconstruction.
E. Laridon, M. Shahabpour, F. Machiels, J. Alexiou, P. Vorlat, J. de Mey; Brussels/BE

Uncommon soft tissue mass in the knee: case report and differential diagnosis
A. Schiettecatte[1], M. Shahabpour[1], F. Vanhoenacker[2], N. Pouliart[1], A. Goossens[1], F. Machiels[1], J. de Mey[1]; [1]Brussels/BE, [2]Antwerp/BE

Functional kinemri in whiplash patients
R. Mikkonen[1], M. Paatelma[1], J. Kettunen[2], K. Lindgren[2]; [1]Vantaa/FI, [2]Helsinki/FI

Rheumatoid arthritis at 3 Tesla MRI:The proximal interphalangeal joints (PIPs), using a high-resolution microscopy coil
I. Nöbauer-Huhmann, E. Jimenez-Boj, J. Zwerina, F. Kainberger, M. Bittsansky, K. Pinker, G. Schett, H. Imhof, J. Smolen, S. Trattnig; Vienna/AT

Highresolution MRI of suspected acromioclavicular dislocation compared to digital weightbearing radiographs
C. Krestan, C. Fialka, M. Weber, M. Mayerhoefer, H. Imhof; Vienna/AT

Imaging of the knee synovial tumors
M.C. Bouaziz, M. Jertila, M.F. Ladeb; Ksar Said/TN

Tibial Adamantinoma. Report of two cases
M.C. Bouaziz, M.S. Daghfous, M.F. Ladeb; Ksar Said/TN

Spinal deformities in sickle cell anemia
M.C. Bouaziz[1], M.S. Daghfous[1], S. Ladeb[2], O. Zouari[1], M.F. Ladeb[1]; [1]Ksar Said/TN, [2]Tunis/TN

MRI in diagnosing of rheumatoid arthritis of hand
O.V. Mazurenko, Y.S. Babij; Kiev/UA

CT Arthrography immediately followed by MR in shoulder dislocation: comparison of both techniques for assessment of bone and capsulolabral lesions
M. Dezillie[1], N. Pouliart[1], M. De Maeseneer[2], J. de Mey[1], M. Shahabpour[1]; [1]Brussels/BE, [2]North Carolina/US

Reproducibilty of measurement of Acetabular Index(AI) in the assessment and follow-up of children with suspected hip dysplasia.
N. Napier, J.M. Elliot, B. Trainor, P. Haugh, A. McAlister, C. Cardwell; Belfast/IE

Discrimination between benign and malignant vertebral fractures using Diffusion-Weighted MR Imaging Apparent Diffusion Coefficients
E. Vafeiadis, T. Gerukis, K. Koutroumanidis, S. Koptopoulos, V. Kalpakidis, P. Palladas; Thessaloniki/GR

A Magnetic Resonance Imaging Study of Cross-Sectional Area of the Cervical Extensor Musculature in an Asymptomatic Cohort
G.L. Durbridge, J.M. Elliott, G.A. Jull, J.T. Noteboom, W.W. Gibbon; Brisbane/AU

Radiographic diagnosis of Trisomy 18 - a pictorial review of 17 cases
B. Gonçalves, J. Brito, O. Vaz, M. Monteiro-Ferreira, F. Caseiro-Alves; Coimbra/PT

Congenital Synspondylism(Spondylocarpotarsosynostosis syndrome)- Case reports and pictorial review
P. Rajiah, S. Abdu; Manchester/GB

Radiology in Costello Syndrome- A case report
P. Rajiah, S. Abdu; Manchester/GB

Sacroplasty
N. Vishwanath, P. Wilson, R. Whitehouse; Manchester/GB

MR imaging in differentiating synovial chondromatosis and chondrosarcoma: a case report.
M. Dezillie, M. Shahabpour, A. Goossens, Y. Anciaux, J. de Mey, N. Pouliart; Brussels/BE

Case of Osteochondroma arising from posterior elements in upper thoracic spine
N. Malay, T. Friesem, L. Marshman, G. Reddy; Stockton On Tees/GB

Ultrasound Hands-on Training

Location

The ultrasounds hands-on training will be given in the rooms Morus and Erasmus, on the first floor of the conference center.

Schedule and practical arrangements

The detailed time-schedule for the ultrasound hands-on training is available at the reception desk.

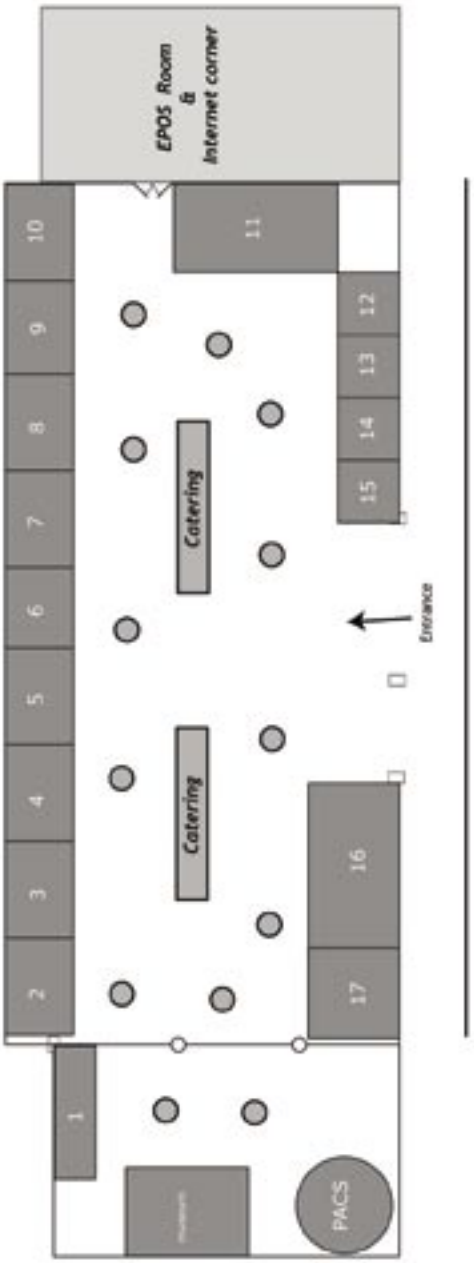
June 9th, 2006
- 10h00 - 11h00 : Session 1
- 11h00 - 12h00 : Session 2
- 14h00 - 15h00 : Session 3
- 15h00 - 16h00 : Session 4

June 10th, 2006
- 10h00 - 11h00 : Session 5
- 11h00 - 12h00 : Session 6

Ultrasound hands-on training has been made possible by the kind cooperation of

Biomedic - Aloka	http://www.aloka-europe.be/
Esaote Pie Medical	http://www.esaote-piemedical.nl/
GE Healthcare	http://www.gehealthcare.com/worldwide.html
Hitachi Medical Systems	http://www.hitachi-medical-systems.be/
Philips	http://www.medical.philips.com/
Siemens Medical	http://www.medical.siemens.com/
Toshiba	http://www.toshiba-europe.com/medical

Trade and Technical Exhibition



Location

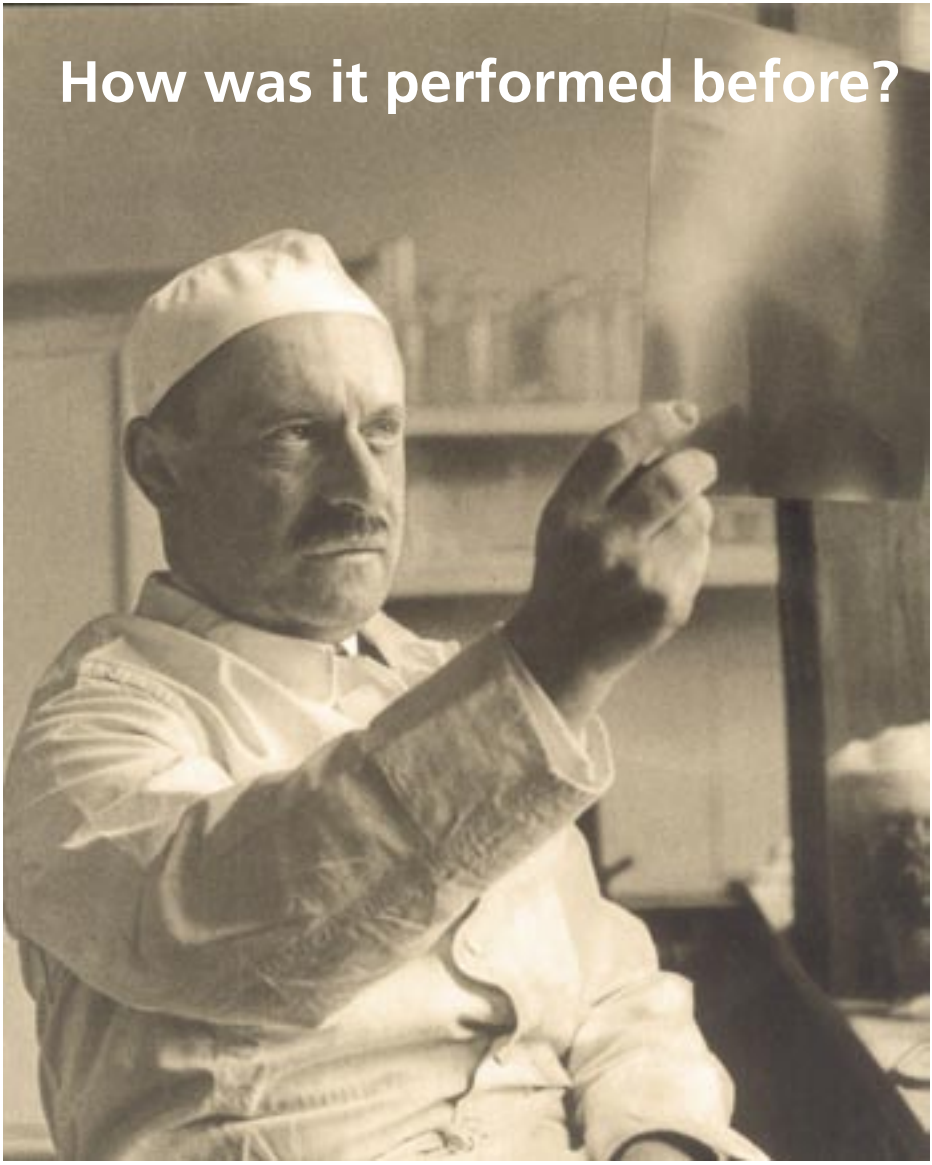
The Trade and Technical Exhibition is situated on the second floor level, in the rooms “De Grote Witte Roos” and “De Kleine Witte Roos”.

Exhibitors

Booth 1	Blackwell Exhibitions www.bookshop.blackwell.co.uk
Booth 2	Oni Medical Systems Inc. www.onicorp.com/
Booth 3	Esaote Pie Medical www.esaote-piemedical.nl www.esaote.com
Booth 4	Hitachi Medical Systems www.hitachi-medical-systems.be
Booth 5	Alliance Medical www.alliancemedical.eu.com
Booth 6	Barco – Medical Imaging Systems www.barco.com
Booth 7	GE Healthcare www.gehealthcare.com
Booth 8	Bracco-Altana Pharma www.altana.com
Booth 9	Genzyme www.genzyme.com
Booth 10	Philips Medical Systems www.medical.philips.com
Booth 11	Oldelft Benelux www.oldelftbenelux.nl
Booth 12	Toshiba Medical Systems www.toshiba-europe.com/medical
Booth 13	Aloka Biomedic Belgium www.aloka-europe.com
Booth 14	Siemens www.medical.siemens.com
Booth 15	TRB Chemedica www.trbchemedica.com
Booth 16	Schering www.schering.be www.schering.com
Booth 17	Guerbet - Codali www.guerbet.com/

Department of Radiology,
"St Jan" Hospital Bruges, 1906.
Courtesy of Mrs H. Bruyne,
Archivist OCMW Bruges

Knee X-ray examination?



Belgian Museum of Radiology
Website: www.radiology-museum.be
E-mail: info@radiology-museum.be

Milestones in radiological imaging of the knee.

In most centers, magnetic resonance imaging (MRI) has replaced arthrography as the modality of choice for imaging of the knee. But what happened before?

In 1905, K.R. Werndorff and H. Robinsohn were the firsts to describe examination of the internal structures of the knee after the insufflation of oxygen into the joint.

Kaisin A. clarified the conditions of the use of oxygen when radiographing articulations, in the first issue of the "Journal belge de Radiologie" in 1907. In order to avoid complications as well as the toxic effects of oxygen and the possibility of gazeous embolism by intra-venous forced entry, he recommended to use a low pressure (less than a quarter of an atmosphere), compression above the knee and the emptying of the joint before removing the compression (fig).

In 1926 Sievers R. introduced positive contrast arthrography. He used sesame seed oil, commercialized by the Merck company as Jodipin®.

In 1931, E. Bircher was the first to perform a double contrast arthrography by using a combination of gas and positive contrast medium.

In 1964, Ricklin P. and colleagues introduced fluoroscopic spotfilming; the golden standard for twenty years... and more !

R. Van Tiggelen (MD)
Curator

Extract from the first issue of the "Journal belge de Radiologie" 1907: 1, P.61.

Facsimile of the first paper about arthrography pubilshed in the "Journal belge de Radiologie" (January 1907). This journal was the first in the world to publish exclusively radiological material in French and was published by the Belgian Radiological Society.

Kaisin Albert (1869-1967)
Physician of Floreffe (Belgium), specialist in bone disease, met Prof. Röntgen in 1898, during his fellowship in the department of Prof. Hoffa;... he became radiologist!
Co-founder with other colleagues, in 1906, of the Belgian Radiological Society.

Authors Index

Listed are the authors of the refresher courses, parallel sessions, industry meets science sessions and scientific sessions.

FWO

The ESSR 2006 congress of the European Society for Musculoskeletal Radiology is organized with the support of the Fund for Scientific Research (FWO)-Flanders.

Thank you

Thanks to all attendees, committee members and sponsors for helping to make this congress a success

This congress is made possible with the kind support of

Oldelft Benelux
Schering

Alliance Medical
Bracco Altana Pharma
Esaote Pie Medical
GE Healthcare
Genzyme
Guerbet
Hitachi Medical Systems
ONI Medical Systems, Inc
Philips

Barco Medical Imaging Systems
Biomedic - Aloka
Siemens Medical
Toshiba
TRB Chemedica

Agfa Healthcare

Eizo
FWO