The International Skeletal Society
2017 *Meeting*

New York Hilton – Midtown
New York, NY
USA

Radiologists/Pathologists
Review of Cases
August 26 – 27, 2017

Pathology Orthopedic Course
August 27, 2017

Members' Meeting
August 28 – 29, 2017

44th Annual Musculoskeletal
Imaging Course: Fundamentals
to Advanced Concepts
August 30 – September 1, 2017

Program and
Case Presentations

2017

Skeletal Radiology

Aims and scope

Skeletal Radiology, the official journal of the International Skeletal Society, serves as a forum for the dissemination of current knowledge and information dealing with disorders of the musculoskeletal system including the spine. Although the radiological aspects of the many varied skeletal abnormalities are emphasized, the journal also adopts an interdisciplinary approach, reflecting the membership of the International Skeletal Society. Thus, the anatomical, pathological, physiological, clinical, metabolic and epidemiological aspects of the many entities affecting the skeleton each receive appropriate consideration.

The format of the journal consists of two principal sections. One section, approximately one third of the journal, includes a number of short case presentations, including histological sections where relevant and a bibliography of the important references. Many of the cases published are selected from the extensive repertoire of material presented at the annual meetings of the International Skeletal Society, at which members of the society present a series of interesting and instructive proved cases over a three day weekend meeting. In addition, case reports from nonmembers of the Society are published if considered suitable, as determined by the Editor of the section. Nonmembers, therefore, are encouraged to send such cases for editorial consideration. The published cases in this section are selected carefully, not only for their esoteric qualities, but even more importantly, for their inherent value as teaching and, hopefully, learning exercises. The second section, which is approximately two thirds of the journal, is more traditional being concerned with the publication of proffered articles. Their selection is made by the editors-in-chief, who have the input of a distinguished board of editorial consultants, international in scope, representing multiple disciplines concerned with disorders of the skeleton. Although emphasis is placed on manuscripts of a radiological interest, articles submitted in inter-related disciplines are encouraged. It is also stressed that material dealing with all phases of radiology is welcomed. Thus, in addition to conventional diagnostic radiology, proffered subject materialmay cover nuclear radiology, computerized axial tomography, and magnetic resonance imaging where applicable.

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V.i.S.d.P Daniel I. Rosenthal, Mark J. Kransdorf

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2017 Meeting

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August 27, 2017

Members' Meeting
August 28 – 29, 2017

Ultrasound Course
August 29, 2017

44th Annual Musculoskeletal Imaging Course: Fundamentals to Advanced Concepts
August 30 – September 1, 2017

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The International Skeletal Society
General Information for Members

Members' Meeting
Needs
The ISS members' meeting session will address unusual and interesting case presentations for radiologists, pathologists, surgeons, and oncologists in bone and soft tissue/ musculoskeletal fields. The presentations will detail how the usually difficult radiologic and pathologic diagnoses were established and how it can be applied to other cases in daily practice. Case presentation learning raises the level of critical thinking skills, enhances listening skills and helps connect theory and practice. Case-based learning also provides opportunities for richer, deeper exploration of concepts and ideas and application to daily practice and patient care.

The field of Musculoskeletal disease is consistently changing with cutting edge research. Radiologists and pathologists, surgeons and oncologists together need to be updated on the most recent research in order to stay current and provide their patients with the best possible diagnosis and care.

Objectives
At the conclusion of the 2017 ISS Members' Meeting, attendees should be able to:
1. Evaluate unusual case presentations, formulate a diagnosis and apply the concepts to other cases.
2. Describe the latest technologies and scientific studies in the field of musculoskeletal imaging and pathology, treatment and outcome, which will provide patients with the best possible care.
3. Review the latest technologies and scientific studies in the field of musculoskeletal imaging and pathology, which will allow the participants to stay current and provide their patients with the best possible care.

Overall Course Outline:
The ISS 44th Annual Meeting and Imaging Update Courses will consist of two parallel programs running concurrently. Course features include: six rapid fire sessions (the quick and dirty details on what you need to know), four SAM's sessions, a differential and diagnosis session presented by the masters of MSK radiology (presentation of big picture thinking and how to narrow the differential), and an "At the PACS session" (combining the realistic case review with dicom case and didactic presentation). The two parallel courses will include the general topics of sports imaging and musculoskeletal diseases. Delegates are encouraged to move between the two streams to tailor the course to their individual needs and learning requirements. An internationally renowned faculty of musculoskeletal radiologists and pathologists will deliver the course.

In addition, the course will feature an expert panel film interpretation session, presented as unknown cases to delegates and allowing them to test their knowledge against two teams of faculty members.

Ultrasound Course
Needs
The need for the hands-on ultrasound workshop and lectures has been established from discussions with the ISS Program Committee, the feedback from the past ISS program committee, the feedback from past ISS hands-on workshops, as well as participant participation in other similar hands-on ultrasound workshops across the world. The topic chosen for this year's course is Ultrasound guided musculoskeletal intervention is the shoulder. In addition to didactic lectures, the group will take advantage of the ability to use models for training. This will allow delegates to work in small groups with experts to refine their skills identifying safe and accurate approaches to MSK interventional procedures.

Objectives
At the conclusion of the 2017 ISS Ultrasound Course, attendees should be able to:
1. Explain the pathophysiology and imaging findings of commonly encountered musculoskeletal disorders and sports related injuries.
2. Identify appropriate utilization of radiographs, CT, MRI and ultrasound for evaluating musculoskeletal disorders.

ISS 44th Annual Meeting and Musculoskeletal Imaging Course: Fundamentals to Advanced Concepts
Needs
Musculoskeletal imaging involves a broad spectrum of pathology including sports related injuries, trauma, arthritis, infection, osseous and soft tissue tumors, and metabolic bone disease. The diagnosis and management of musculoskeletal disorders increasingly relies upon advanced imaging. Further, image guided biopsy and therapeutic interventions play an important role in the management of musculoskeletal disorders. Given these demands, musculoskeletal imagers require ongoing education to maintain an extensive knowledge base, be skilled in state-of-the-art imaging techniques, and understand the latest advances in clinical management.

This refresher course is structured to fully address the educational needs of musculoskeletal imagers. Two parallel tracks in sports medicine imaging and musculoskeletal imaging provide attendees a wide selection of activities to fulfill their individual educational needs. Educational sessions within each track concentrate on specific pathology and anatomic regions. Conventional didactic lectures are supplemented by highly focused "rapid fire" sessions to maximize the educational yield for participants.

To facilitate integration of educational material into clinical practice, attendees are encouraged to participate in case interpretation sessions. Interactive events include a film interpretation panel and an innovative "at the PACS" session combining real-time interpretation with didactic materials.

The sports medicine imaging track includes topics reviewing anatomy and pathology of the shoulder, elbow, wrist, hip, knee, ankle and foot. Rapid fire sessions focus on sites of complex anatomy and specific injuries. Special sessions addressing tendon, cartilage, bone and muscle emphasize the evaluation of musculoskeletal structural substrates, affording an in-depth exploration of biomechanics, pathophysiology, and advanced imaging. Attendees are assured of an expansive educational experience with offerings that include tendon histopathology, advanced cartilage imaging, pediatric sports injuries, postoperative imaging, and numerous specific sports related injuries.

Advanced imaging techniques are discussed using the popular rapid fire format, including whole body MRI, dual energy CT and metal artifact reduction methods.

The primary goal of the refresher course is to provide a rich educational experience for attendees. The wide variety of educational sessions allows participants to remedy educational gaps, regardless of experience or scope of practice. Attendees of the course can expect to gain in depth knowledge of common clinical entities and exposure to uncommon disorders, while also learning of the latest innovations in advanced imaging and therapeutic interventions.

Objectives

At the conclusion of the ISS 44th Annual Meeting and Musculoskeletal Imaging Course, attendees should be able to:

1. Explain the pathophysiology and imaging findings of commonly encountered musculoskeletal disorders and sports related injuries.
2. Identify appropriate utilization of radiographs, CT, MRI and ultrasound for evaluating musculoskeletal disorders.
3. Describe innovative imaging techniques for evaluating the musculoskeletal system.
4. Enhance knowledge of musculoskeletal therapeutic interventions.
5. Apply newly acquired knowledge during interactive interpretive sessions.

CONTINUING MEDICAL EDUCATION CREDIT INFORMATION

Accreditation

In support of improving patient care, Rush University Medical Center is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

AMA PRA Category 1 Credits™

Rush University Medical Center designates this live activity for a maximum of 50.25 AMA PRA Category 1 Credit(s)™. Physicians should claim only credit commensurate with the extent of their participation in the activity.

The musculoskeletal disease track covers a broader array of pathology, acting as both a comprehensive review and update on recent advances. Common musculoskeletal findings are discussed in an introductory "differential and diagnosis" session, with subsequent sessions on trauma, bone and soft tissue tumors, metabolic bone disease and arthritis. Additional sessions address disorders of the spine and peripheral nerves, imaging of orthopedic hardware, and musculoskeletal therapeutic interventions.

CME Credit Breakdown

Portions of Monday and Tuesday's sessions are concurrent; therefore, it is not possible to obtain full credit for all programs listed below.

The CME Credit breakdown per sessions is as follows: **Members' Meeting (14.25), the Breakout Scientific Session (1.00), the Special Scientific Session (3.75), Controversies in Sports Imaging (2.0), the Ultrasound Course (5.50), Microscope Room Case Review (13.25),**

One Day Interdisciplinary (Pathology, Orthopedic, Radiology), Bone Course (7.0), Electronic PowerPoint Presentations (1.0) and the 44th Annual Meeting and Musculoskeletal Imaging Course: Fundamentals to Advanced Concepts (19.5).

Nurses and other healthcare professionals will receive a Certificate of Attendance. For information on the applicability and acceptance of Certificates of Attendance for educational activities certified for AMA PRA Category 1 Credit™ from organizations accredited by the ACCME, please consult your professional licensing board.

Recognition by the AMA and EACCME

All CME activities approved by the American Medical Association (AMA) are recognized by the European counterpart, the EACCME. Vice-versa all CME activities approved by the EACCME are valid for recognition by the American Medical Association (AMA) towards the Physician's Recognition Award (PRA).

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Special Assistance

We encourage participation by all individuals. If you have a disability, advance notification of any special needs will help us better serve you. Call (847) 752-6245 if you require special assistance to fully participate in the meeting.

Disclosure Information

In compliance with the ACCME Accreditation Criteria, Rush University Medical Center, as the accredited provider of this activity, must ensure that anyone in a position to control the content of the educational activity has disclosed all relevant financial relationships with any commercial interest. All reported conflicts are managed by a designated official to ensure a bias-free presentation.

Registration

Saturday, August 26, 2017 – Sunday, August 27, 2017
10:00 – 17:00
Location: *West Promenade – Second Floor*
Monday, August 28, 2017 – Tuesday, August 29, 2017
07:00 – 17:30
Location: *West Promenade – Third Floor*
Wednesday, August 30 – Friday, September 1, 2017
07:00 – 17:00
Location: *West Promenade – Third Floor*

Radiologists/Pathologists Review of Cases

Saturday, August 26, 2017: 10:00 – 17:00
Sunday, August 27, 2017: 10:00 – 17:00
Location: *Nassau*

Microscopes, glass pathology slides, and printed history, radiologic images, and intraoperative/gross images are available for diagnostic review of unknown members meeting cases. Please fill out provided answer forms with your diagnoses.

One-Day Interdisciplinary Bone Course: Radiology, Pathology, and Orthopedics

Sunday, August 27, 2017: 08:00 – 16:30
Location: *Gramercy*

- ***Radiology, Pathology, and Orthopedic One-Day Bone Course (Pathology Orthopedic Course)***
  Sunday, August 27, 2017: 08:00 – 16:30
  Location: *Gramercy*
- ***Members' Business Meeting***
  Monday, August 28, 2017: 07:00 – 08:00
  Location: *Grand Ballroom West – Third Floor*
- ***Members' Meeting of the ISS***
  Monday, August 28, 2017: 08:00 – 17:00 and
  Tuesday, August 29, 2017: 07:30 – 17:00
  Location: *Grand Ballroom West – Third Floor*
- ***Controversies in Sports Imaging***
  Monday, August 28, 2017: 09:00 – 11:00
  Location: *Murray Hill*
- ***Founders Lecture***
  Monday, August 28, 2017: 11:30 – 12:30
  Location: *Grand Ballroom West / Third Floor*
- ***Members' Business Lunch***
  Monday, August 28, 2017: 12:30 – 13:30
  Location: *Mercury Ballroom*
- ***Special Scientific Session***
  Monday, August 28, 2017: 13:30 – 17:30
  Location: *Murray Hill*
- ***Electronic Powerpoint Presentations***
  Monday, August 28, 2017: 17:00 – 18:00
  Location: *Grand Ballroom Foyer*
- ***Breakout Scientific Session***
  Tuesday, August 29, 2017: Session 1: 12:00 – 12:30
  Location: *Morgan* Session 2: 12:30 – 13:00

Most case presentations have been assigned a 15-minute time slot, unless otherwise noted. Please note, those assigned 15 minutes should have a presentation of no more than 10 minutes' duration with five minutes reserved for comments and questions from the audience. Case presentations that have been assigned a 10-minute time slot will share discussion time with another case presentation. You are strongly urged to keep within the allocated time. Ten-minute time slots have been assigned for the papers during the Special Scientific Session on Monday afternoon with seven minutes devoted to the presentations and three minutes reserved for discussion.

44th Annual Musculoskeletal Imaging Course: Fundamentals to Advanced Concepts

- Wednesday, August 30, 2017: 08:00 – 17:00
  Location: *Grand Ballroom East (Sports) & West (MSK)*
- Thursday, August 31, 2017: 08:00 – 17:00
  Location: *Grand Ballroom East (Sports) & West (MSK)*
- Friday, September 1, 2017: 08:00 – 17:00
  Location: *Grand Ballroom East (Sports) & West (MSK)*

Ultrasound Workshops: Shoulder Ultrasound

1. Lectures and Demonstrations
Tuesday, August 29, 2017: 09:00 – 10:30
Location: *Murray Hill* (combined session)
Ultrasound Group A:
Tuesday, August 29, 2017: 11:00 – 13:00
Ultrasound Group B:
Tuesday, August 29, 2017: 14:00 – 16:00

2. Hands-on
Location: *Gramercy*
Ultrasound Group B:
Tuesday, August 29, 2017: 11:00 – 13:00
Ultrasound Group A:
Tuesday, August 29, 2017: 14:00 – 16:00

Electronic Poster Sessions

Monday – Friday, 07:00 – 17:00
Location: *Grand Ballroom Foyer*

Speaker Presentation Uploading

We encourage all speakers to upload their presentations at least one day prior to their scheduled talk time. To upload your presentation early, please visit the *Gibson Room (Second Floor)* during the following hours:

Saturday, August 26, 2017:	10:00 – 17:30
Sunday, August 27, 2017:	10:00 – 17:30
Monday, August 28, 2017:	07:00 – 17:30
Tuesday, August 29, 2017:	07:00 – 17:30
Wednesday, August 30, 2017:	07:00 – 17:30
Thursday, August 31, 2017:	07:00 – 17:30

If you are unable to upload your presentation early and need to do so the day of your talk, a technician will be located in the back of each session room to upload your presentation.

Social Events

Members and Partners Only

- **Society Members' Reception**
  Monday, August 28, 2017: 18:00 – 19:30
  Attire: Resort Casual
  Location: *Private Room*
  Members Only

- **Society Members' Business Lunch***
  Monday, August 28, 2017: 12:00 – 13:00
  Attire: Business Casual
  Location: *Mercury Ballroom*
  * Tickets are required for the Society Members' Business Lunch and are available at the Registration/Information Desk.
  Members and Partners Only

- **Society Members' Dinner***
  Tuesday, August 29, 2017: 18:30 – 23:00
  Attire: Formal
  Location: *Rainbow Room in Rockefeller Plaza*
  *Tickets are required for the Society Members' Dinner and are available at the Registration/Information Desk.

  Join us at this year's Member's dinner for a classic New York experience. Since its debut in 1934, the Rainbow Room has drawn the world's elite to its curated, elevated and glamorous luxury. Indulgent and tailored celebrations await 65 stories above the landmark Rockefeller Center where historic prestige meets the current, demanding standards of excellence for an unforgettable evening. Located just a few blocks away from the Hilton Midtown in the Rockefeller Center at 30 Rockefeller Center, New York.

Open to Members and Musculoskeletal Imaging Course Registrants:

- **Welcome Reception**
  Wednesday, August 30, 2017: 18:30 – 20:30
  Attire: Business Casual
  Location: *Trianon Complex (New York Hilton Midtown)*

Each year some members indicate they will attend the luncheon, reception or dinner, and a reservation is made for them and a companion. At that point, if the member and guest do not attend, the Society still must pay for the reservation(s). As you can imagine, this can be a fair sum of money. Please do not ask for a reservation if you do not intend to attend. We ask this of the members and guests for all food functions. Please help us conserve the Society's funds. We appreciate your assistance. Thank you!

Have a wonderful time in New York City, and please let us know if we may assist you in any way.

William Palmer, MD
President

Julie C. Fanburg-Smith, MD
Chair, Members' Meeting

Christine B. Chung, MD
Chair, Refresher Course Program Committee

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Program International Skeletal Society 2017

Members' Meeting

Day 1

AUGUST 2017						
	Sun 27	Mon 28	Tue 29	Wed 30	Thu 31	Fri 1

10:00 – 17:00	Registration/Information Desk Hours . . . . . *West Promenade – Second Floor*
10:00 – 17:00	Microscope Room Review of Members . . . . . *Nassau* Meeting Cases; Members are asked to submit their diagnoses on the forms provided.

Members' Meeting

Day 2

AUGUST 2017						
Sat 26	Sun 27	Mon 28	Tue 29	Wed 30	Thu 31	Fri 1

10:00 – 17:00	Registration/Information Desk Hours . . . . . *West Promenade – Second Floor*
10:00 – 17:00	Microscope Room Review of Members . . . . . *Nassau* Meeting Cases; Members are asked to submit their diagnoses on the forms provided.
08:00 – 16:30	One-Day Interdisciplinary Bone Course: Radiology, Pathology, and Orthopedics . . . . . *Gramercy*
08:00 – 09:00	Committee Meeting: Board of Trustees . . . . . *Clinton* of the Endowment Fund
09:00 – 10:00	Committee Meeting: Convention Planning. . . . . *Clinton*
10:00 – 16:00	Executive Committee Meeting . . . . . *Clinton*

Radiology, Pathology, and Orthopedic One-Day Bone Course

Course Directors: Dr. Julie C. Fanburg-Smith, Dr. Mark D. Murphey, Dr. Franklin H. Sim

Day 2

AUGUST 2017						
Sat 26	**Sun 27**	Mon 28	Tue 29	Wed 30	Thu 31	Fri 1

Part 1: Benign Bone and Joints

Moderators: Dr. Julie C. Fanburg-Smith, Dr. S. Fiona Bonar, Dr. Edward DiCarlo

08:00 – 08:20	**Healthy Bone Matrix and Cellular Milieu** Dr. Julie C. Fanburg-Smith
08:20 – 08:40	**How Radiology Can Help the Pathologist in the Interpretation of Benign Conditions** Dr. Mark D. Murphey
08:40 – 09:00	**Pathological Aspects of Common Bone Disorders** Dr. S. Fiona Bonar
09:00 – 09:25	**Anatomy and Pathology of the Diarthrodial and Amphiarthrodial Joints** Dr. Edward DiCarlo
09:25 – 09:45	**What Every Pathologist Should Know About Metabolic Bone Disease** Dr. Edward McCarthy
09:45 – 10:00	Coffee Break

Part 2: Benign versus Malignant Bone Forming Tumors

Moderators: Dr. Franklin H. Sims, Dr. Carrie Y. lnwards

10:00 – 10:30	**Pathologic Pitfalls in the Diagnosis of Osteosarcoma** Dr. Carrie Y. Inwards
10:30 – 11:00	**Imaging of Bone Forming Tumors: Tricks of the Trade** Dr. Doris E. Wenger
11:00 – 11:45	**Update of the Surgical Approach of Osteosarcoma and its Mimics** Dr. Franklin H. Sim
11.45 – 12.45	Lunch Break

Radiology, Pathology, and Orthopedic One-Day Bone Course

Course Directors: Dr. Julie C. Fanburg-Smith, Dr. Mark D. Murphey, Dr. Franklin H. Sim

Day 2

AUGUST 2017						
Sat 26	Sun 27	Mon 28	Tue 29	Wed 30	Thu 31	Fri 1

Part 3: Conventional Chondrosarcoma and Chordoma: Challenges Associated with Diagnosis and Treatment

Moderators: Dr. Andrew E. Rosenberg, Dr. Franklin H. Sim, Dr. Mark D. Murphey

Session 1: Enchondroma versus Conventional Chondrosarcoma

12:45 – 01:00	**The Pathologist's Dilemma** – Dr. Andrew E. Rosenberg
01:00 – 01:15	**The Rules of Radlology** – Dr. Mark D. Murphey
01:15 – 01:30	**Is There a Role for Molecular Analysis?** – Dr. Adrienne Flanagan
01:30 – 01:45	**What Matters to the Surgeon** – Dr. Carol Morris

Session 2: Benign Notochordal Cell Tumor versus Chordoma

01:45 – 02:00	**ls the Microscope Enough?** – Dr. G. Petur Nielsen
02:00 – 02:15	**The Radiologist's Criteria.** – Dr. Mark D. Murphey
02:15 – 02:25	**Can Molecular Pathology Help?** – Dr. Adrienne Flanagan
02:25 – 02:45	**The Surgeon's Perspective** – Dr. Francis Hornicek
02:45 – 03:00	Coffee Break

Part 4: Giant Cell Rich and Epithelioid Vascular Tumors of Bone

Moderators: Dr. Meera Hameed, Dr. John Healey

03:00 – 03:20	**What's New in Epithelioid Vascular Lesions of Bone?** Dr. Cristina Antonescu
03:20 – 03:50	**Updated Clinical Approach to Giant Cell Tumors and Vascular Tumors** Dr. John Healey
03:50 – 04:10	**Will the Real Giant Cell Tumor Please Stand Up?** Dr. Meera Hameed
04:10 – 04:30	**Radiologic Shadows of Tumors Rich in Giant Cells and Vessels** Dr. Sinchun Hwang

Members' Meeting

Day 3

AUGUST 2017

Sat 26	Sun 27	Mon 28	Tue 29	Wed 30	Thu 31	Fri 1

07:00 – 17:30 Registration/Information Desk Hours . . . . . *West Promenade – Third Floor*

07:00 – 08:00 Members' Business Meeting . . . . . *Grand Ballroom West / Third Floor*

08:00 – 17:00 Members' Meeting of the ISS . . . . . *Grand Ballroom West / Third Floor*

09:00 – 11:00

Members Meeting (concurrent session)

■ **Controversies in Shoulder Imaging**

Moderators: Mini Pathria, MD & Michael Tuite MD

09:00 **Should we call as infraspinatus tears that are >15mm posterior to the biceps?**
Presented by: Michael Tuite, MD

09:15 **Classification of SLAP tears: does it matter?**
Presented by: David Rubin, MD

09:30 **US vs MR for the middle aged patient with non-specific shoulder pain?**
Presented by: Ken Lee, MD

09:45 **Bone loss after dislocation: when and how to assess, and does it matter?**
Presented by: Soterios Gyftopoulos, MD

■ **Controversies in Imaging FAI**

Moderators: David Rubin, MD & Christian Pfirrmann, MD

10:00 **Asymptomatic Findings: High prevalence of asymptomatic findings – the FAI concept in question**
Presented by: William Palmer, MD

10:15 **"Bump, Waist and Cam" – All the same but different**
Presented by: Christian Pfirrmann, MD

10:30 **Quantitative Imaging of Hip Cartilage: Great techniques – clinically not used**
Presented by: Catherine Petchprapa, MD

10:45 **Femoral Torsion and Version – Stir up of an old story**
Presented by: Reto Sutter, MD

10:00 – 17:00 Microscope Room Available for Review of Cases . . . . . *Nassau*

11:30 – 12:30 Founder's Lecture . . . . . *Grand Ballroom West / Third Floor*

12:30 – 13:30 Members' Business Lunch . . . . . *Mercury Ballroom*

13:30 – 15:30 Special Scientific Session 1 . . . . . *Murray Hill*

15:40 – 17:30 Special Scientific Session 2 . . . . . *Murray Hill*

17:00 – 18:00 Moderated Electronic Powerpoint Presentations . . . . . *Grand Ballroom Foyer*

18:00 – 19:30 Society Members' Reception . . . . . *Private Room*

Members' Meeting

Day 4

AUGUST 2017

Sat 26	Sun 27	Mon 28	Tue 29	Wed 30	Thu 31	Fri 1

07:00 – 17:30	Registration/Information Desk Hours . . . . . *West Promenade – Third Floor*
07:00 – 08:00	Committee Meeting: Intersociety Liaison . . . . *Bryant*
07:30 – 17:00	Members' Meeting of the ISS . . . . . *Grand Ballroom West / Third Floor*
09.00 – 16:00	Ultrasound Course . . . . . *Murray Hill, Gramercy*
10:00 – 17:00	Microscope Room Available for Review of Cases . . . . . *Nassau*
12:00 – 13:15	Lunch (on your own)
12:00 – 13:15	Committee Meeting: Skeletal Editorial Board . . *Concourse B*
12:00 – 12:30	Breakout Scientific Session 1. . . . . *Morgan*
12:30 – 13:00	Breakout Scientific Session 2. . . . . *Morgan*
18:30 – 23:00	Society Members' Dinner . . . . . *Rainbow Room / Rockefeller Plaza*

MSK Imaging Update Courses

Day 5

AUGUST 2017

Sat 26	Sun 27	Mon 28	Tue 29	Wed 30	Thu 31	Fri 1

07:00 – 17:00	Registration/Information Desk Hours . . . . . *West Promenade – Third Floor*
07:00 – 16:00	Exhibit Hall Hours . . . . . *Grand Ballroom Foyer*
08:00 – 17:00	44th Annual Musculoskeletal Imaging Course: Fundamentals to Advanced Concepts
08:00 – 10:00	Combined Session. . . . . *Grand Ballroom East & West*
10:00 – 11:30	Committee Meeting: Research and Education . . . . . *Morgan*
10:30 – 12:00	Elbow . . . . . *Grand Ballroom East*
	Big Picture Thinking by the Masters: How to Organize Your Thoughts . . . . . *Grand Ballroom West*
12:00 – 13:00	Committee Meeting: Committee on Grants . . . . . *Morgan*
12:00 – 13:30	Lunch (on your own)
13:30 – 15:00	Cartilage and Bone: Present and Future . . . . . *Grand Ballroom East*
15:00 – 16:30	Committee Meeting: Refresher Course Planning. . . . *Morgan*
15:30 – 17:00	MSK Intervention . . . . . *Grand Ballroom West*
15:30 – 17:00	Radiologist and Surgeon Collaboration: Insight to Value Added . . . . . *Grand Ballroom East*
16:00 – 17:00	Committee Meeting: Liaison. . . . . *Clinton*
18:30 – 20:30	Welcome Reception . . . . . *Trianon Complex (NY Hilton Midtown)*

MSK Imaging Update Courses

Day 6

AUGUST 2017						
Sat 26	Sun 27	Mon 28	Tue 29	Wed 30	**Thu 31**	Fri 1

07:00 – 17:00	Registration/Information Desk Hours . . . . . *West Promenade – Third Floor*
07:00 – 16:00	Exhibit Hall Hours. . . . . *Grand Ballroom Foyer*
07:00 – 08:00	Committee Meeting: Refresher Course for Promotion . . . *Morgan*
08:00 – 17:00	44th Annual Musculoskeletal Imaging Course: Fundamentals to Advanced Concepts
08:00 – 10:00	Knee. . . . . *Grand Ballroom East* Arthritis (Self Assessment Module) . . . . . *Grand Ballroom West*
10:30 – 12:00	Wrist and Hand – Case Based (ARS) . . . . . *Grand Ballroom East* Pediatric Musculoskeletal Imaging Update . . . . . *Grand Ballroom West*
12:00 – 13:30	Lunch (on your own)
12:00 – 15:00	Executive Committee Meeting . . . . . *Morgan*
13:30 – 15:00	Ankle "At the PACS"; Case and Didactic . . . . . *Grand Ballroom East* Rapid Fire – Bone Tumor. . . . . *Grand Ballroom West*
15:15 – 16:15	Committee Meeting: Electronic Communication and Education . . . . . *Morgan*
15:30 – 17:00	Hip (Self Assessment Module). . . . . *Grand Ballroom East* Spine and Peripheral Nerve – Case Based (ARS) . . . . . *Grand Ballroom West*

MSK Imaging Update Courses

Day 7

AUGUST 2017						
Sat 26	Sun 27	Mon 28	Tue 29	Wed 30	Thu 31	**Fri 1**

07:00 – 17:00	Registration/Information Desk Hours . . . . . *West Promenade – Third Floor*
07:00 – 16:00	Exhibit Hall Hours. . . . . *Grand Ballroom Foyer*
08:00 – 17:00	44th Annual Musculoskeletal Imaging Course: Fundamentals to Advanced Concepts
08:00 – 10:00	Glenohumeral Joint (Self Assessment Module) . . . . . *Grand Ballroom East* Imaging Orthopedic Hardware – Case Based (ARS) . . *Grand Ballroom West*
10:30 – 12:00	Rapid Fire Session – Make the Diagnosis: Know the Lingo for Complex Anatomy/Specific Lesions . . . *Grand Ballroom East* Soft Tissue Tumor . . . . . *Grand Ballroom West*
12:00 – 13:30	Lunch (on your own)
13:30 – 15:00	Muscle Injury – Case Based (ARS) . . . . . *Grand Ballroom East* Trauma (Self Assessment Module) . . . . . *Grand Ballroom West*
15:30 – 17:00	Film Quiz Panel . . . . . *Grand Ballroom East & West*

Case Presentations and Special Scientific Session with Abstracts

Contents

Members' Meeting

Day 3

AUGUST 2017						
Sat 26	Sun 27	Mon 28	Tue 29	Wed 30	Thu 31	Fri 1

08:00 – 10:00

Session I:

Moderators: Fiona Bonar, Mark Kransdorf

Case Presentations

08:00 **Case 1:** C. Morris, L. Fayad, E. McCarthy
(Johns Hopkins, Baltimore, MD, USA)

08:15 **Case 2:** F. Larousserie, J.-L. Drapé
(Cochin, Paris, France)

08:25 **Case 3:** R. Kumar
(MD Anderson, Houston, TX, USA)

08:45 **Case 4:** S. Schiffman, G. Dieudonne, E. Carmody, X. Wang, J. Monu
(University of Rochester, Rochester, NY, USA)

09:00 **Case 5:** T. Bauer, H. Ilaslan
(Hospital for Special Surgery, New York, NY and Cleveland Clinical , Cleveland, OH, USA)

09:15 **Case 6:** S. Wei, M. Frazier, G. Siegal
(University of Alabama, Birmingham, AL, USA)

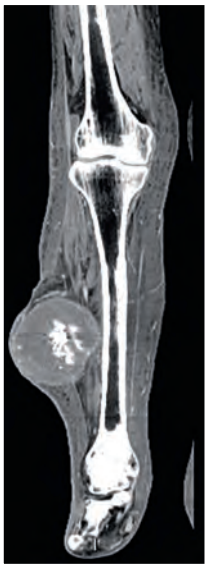
09:30 **Case 7:** T. Nishisho, B. Hoch
(Tokushima University, Tokushima, Japan; University of Washington, Seattle, WA, USA)

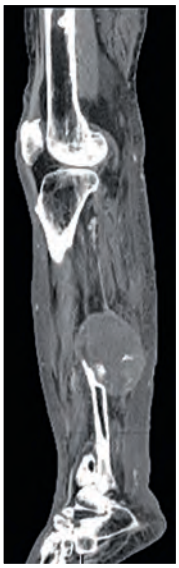
09:45 **Case 8:** M. Murphey, J. C. Fanburg-Smith, A. Zaklama
(American Institute for Radiologic Pathology, Silver Spring, MD and National Academic Pathology VA and National Institutes of Health, Bethesda, MD, USA)

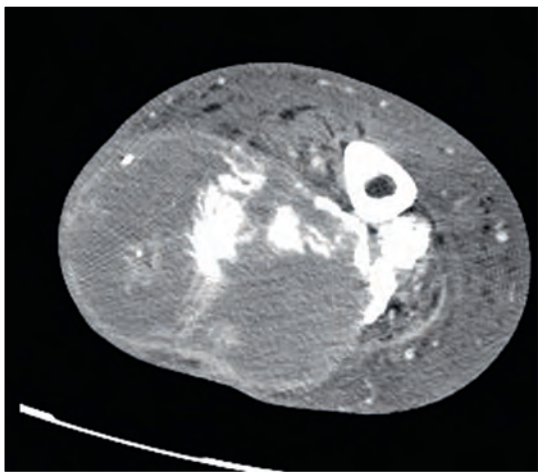
Case 1

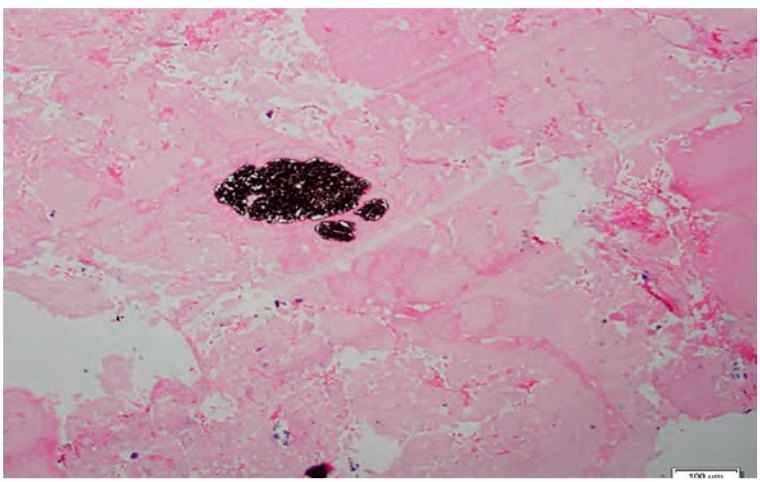
C. Morris, L. Fayad, E. McCarthy
Johns Hopkins, Baltimore, MD, USA

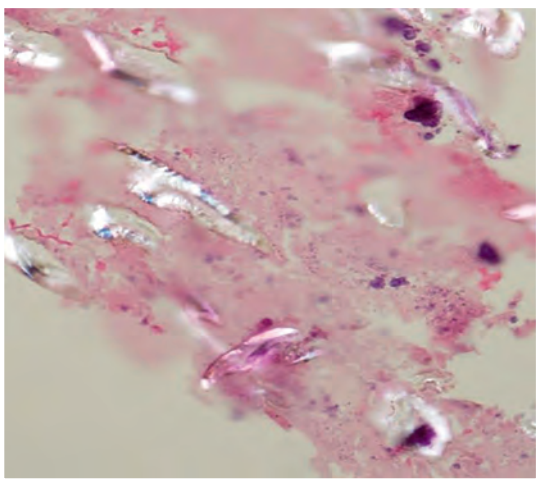
A 70 year old male presents with a one month history of an enlarging mid lower calf mass. His past medical history includes colonic and urothelial carcinoma, cerebral vascular accident, and a motor vehicle accident with fibular fracture 50 years ago.







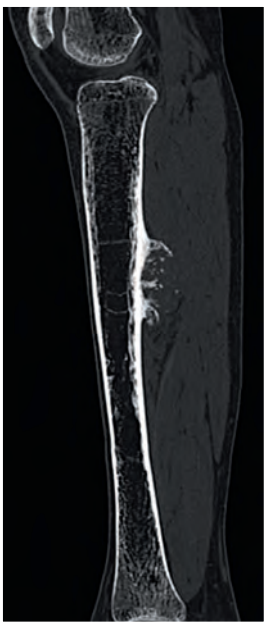


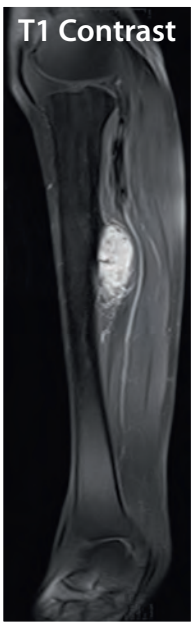


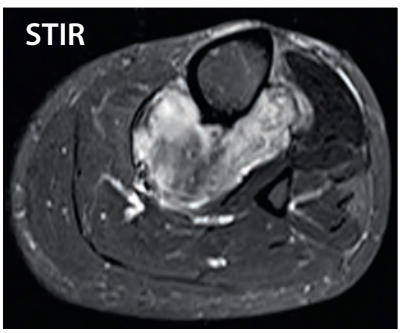
Case 2

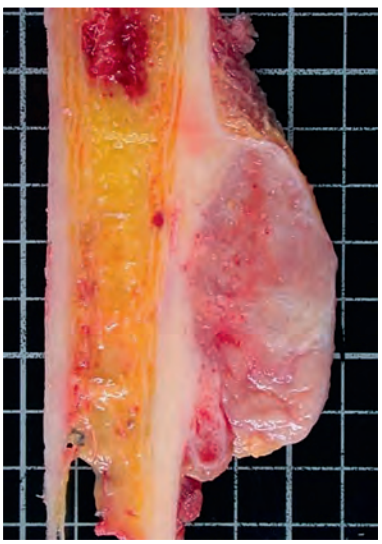
F. Larousserie, J.-L. Drapé
Cochin, Paris, France

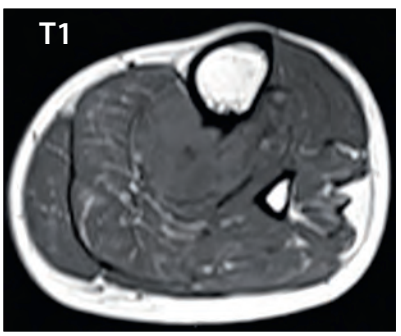
A 27 year old female presents with painful left leg for two months, with notable swelling of the mid posterolateral compartment.

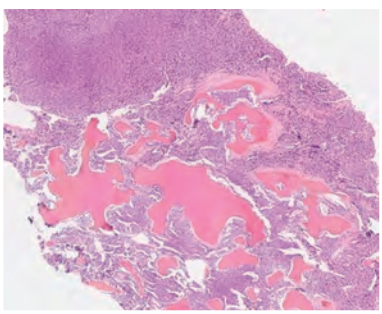


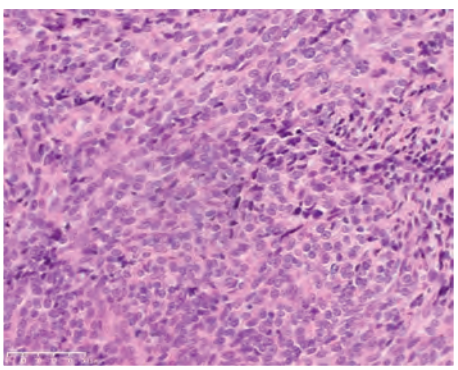


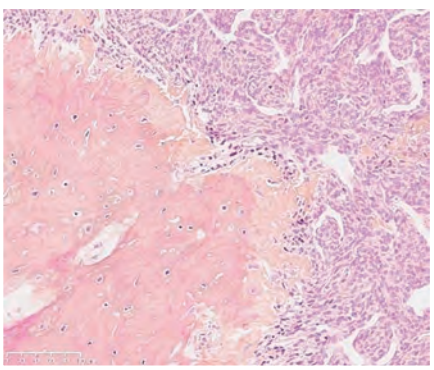








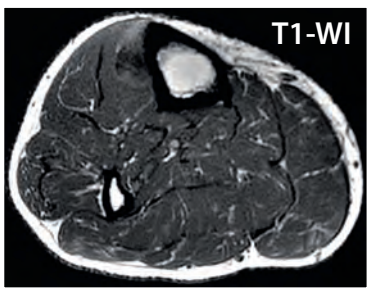


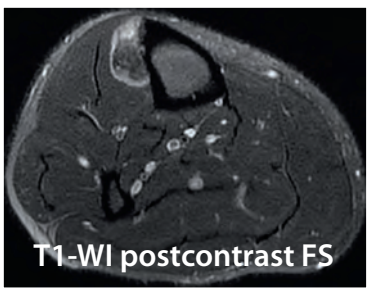


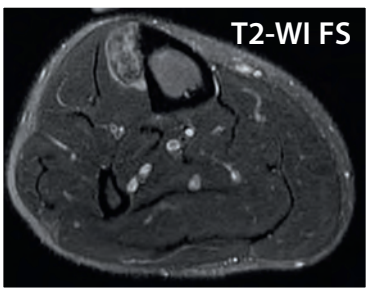
Case 3

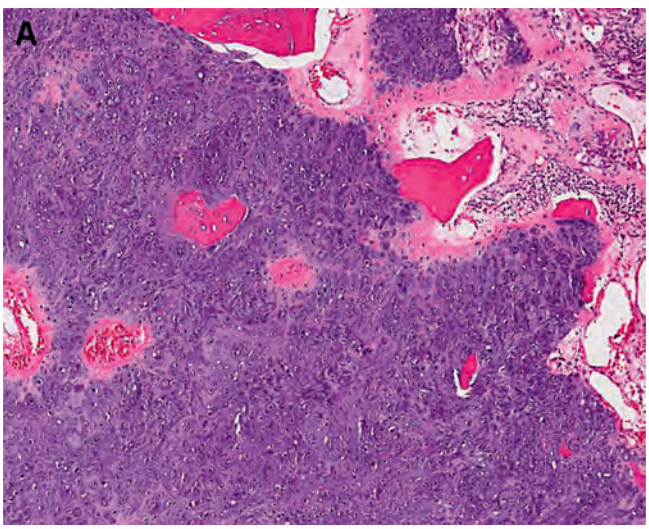
R. Kumar
MD Anderson, Houston, TX, USA

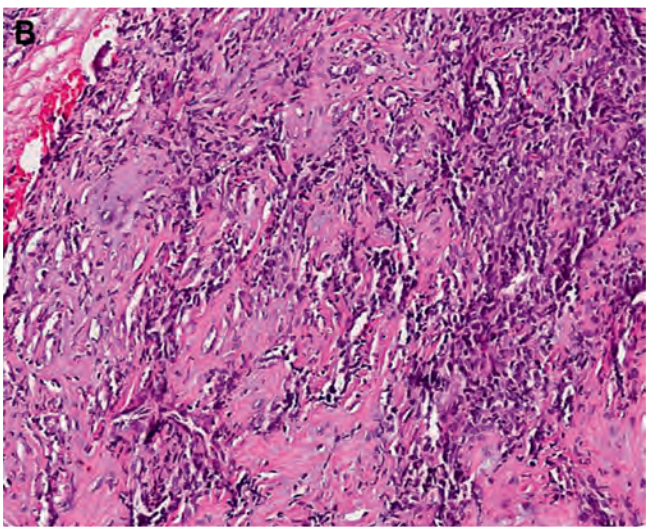
A 41 year old male presents with worsening episodic headaches and back pain for 6 months.







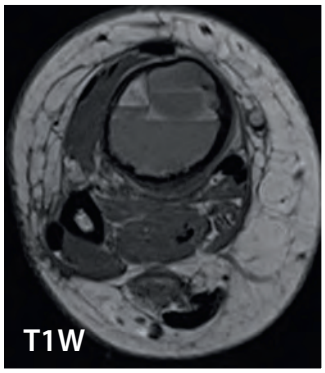


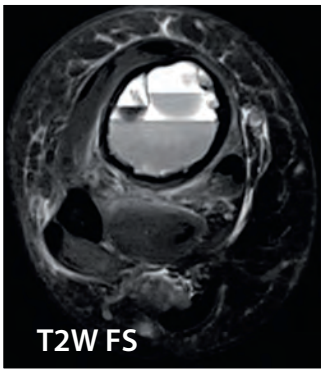


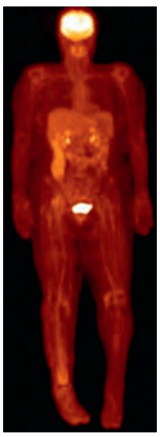
Case 4

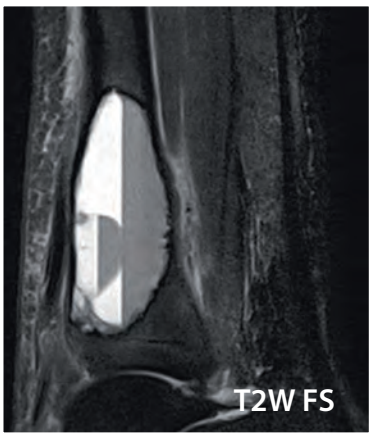
S. Schiffman, G. Dieudonne, E. Carmody, X. Wang, J. Monu
University of Rochester, Rochester, NY, USA

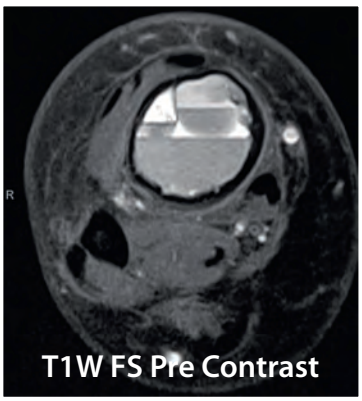
A 55 year old female three months after a ski accident. After rest, pain returned with exercise. Tenderness over the distal tibia and soft tissue swelling is observed.

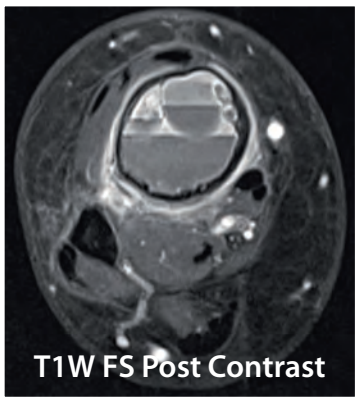


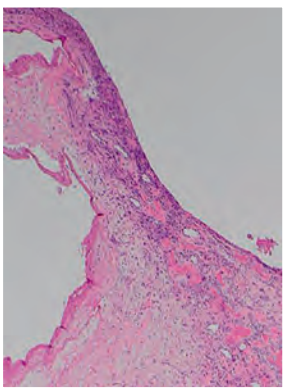


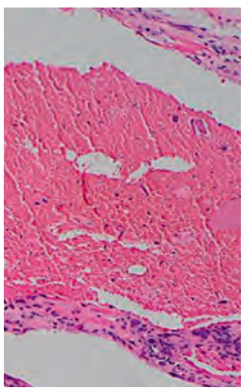


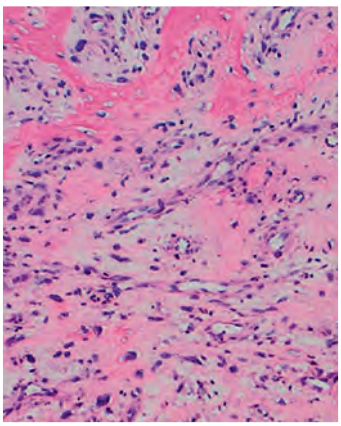


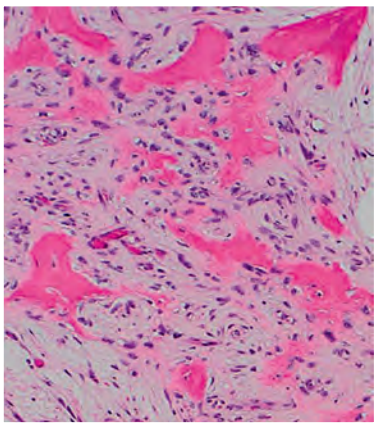








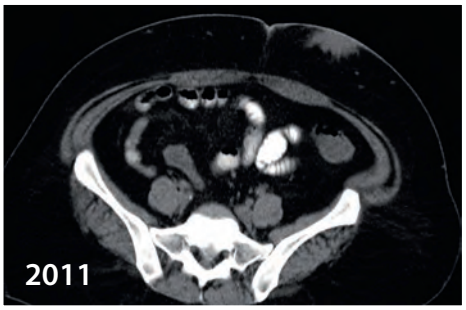


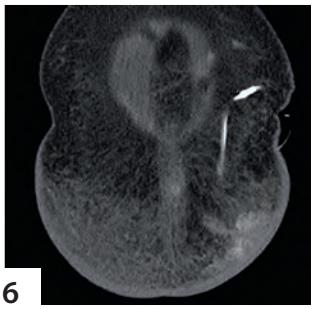


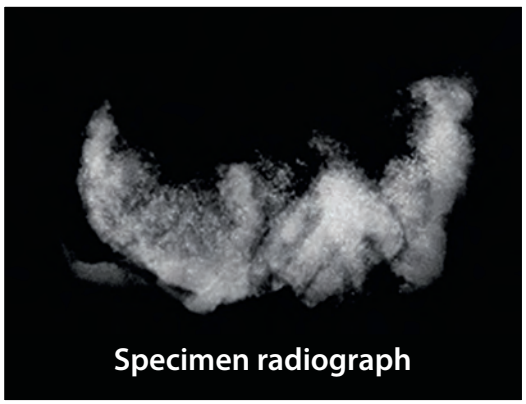
Case 5

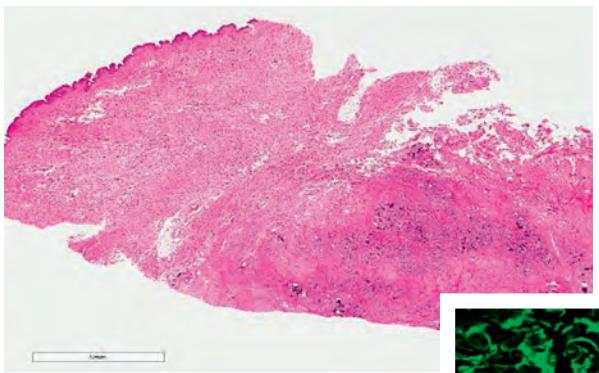
T. Bauer, H. Ilaslan
Hospital for Special Surgery, New York, NY and Cleveland Clinical , Cleveland, OH, USA

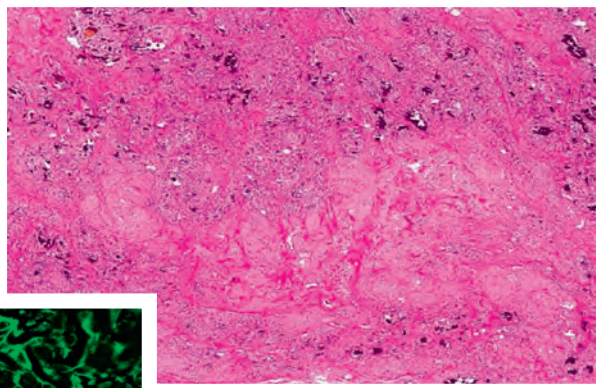
A 45 year old female with a cholecystectomy in 2004, then a peritoneal dialysis catheter insertion in 2016, developed pseudomonas peritonitis 6 months later; surgeon notes dense material surrounding the catheter.

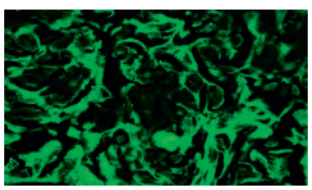


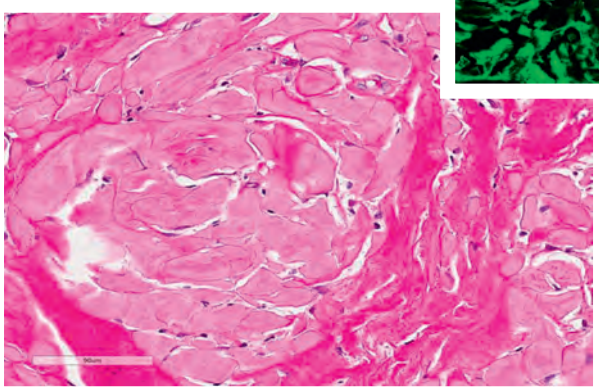


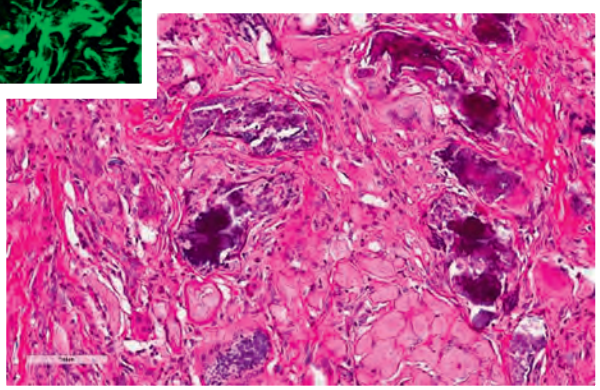








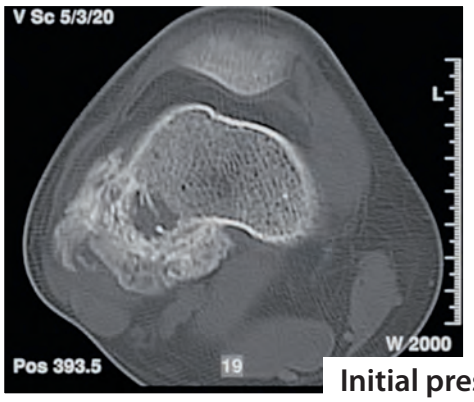


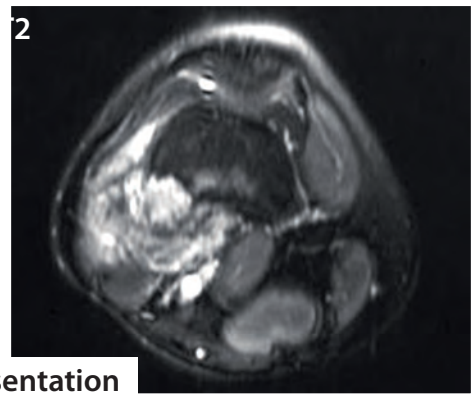


Case 6

S. Wei, M. Frazier, G. Siegal
University of Alabama, Birmingham, AL, USA

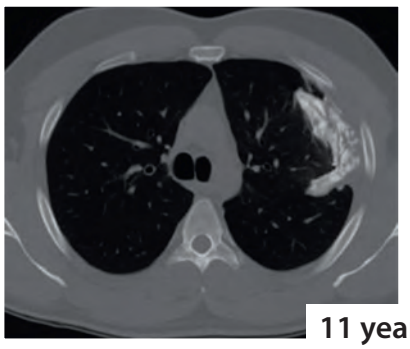
A 32 year old male with an above knee amputation presents with a 6-year history of a left chest protuberance.

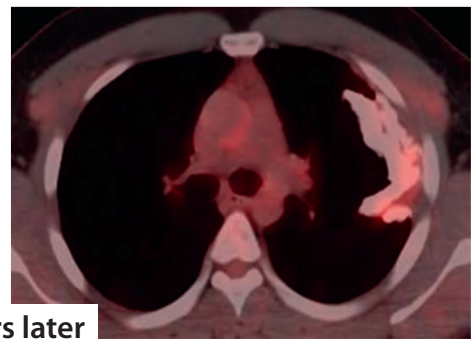




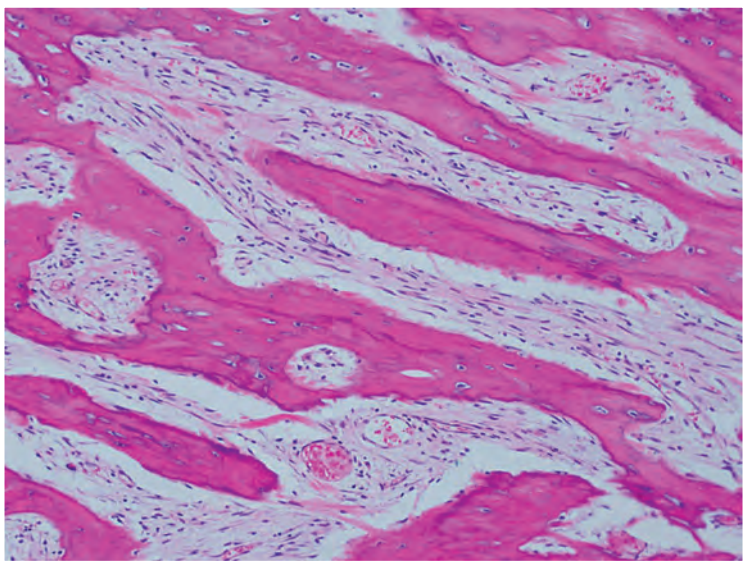
Initial presentation

5 years later





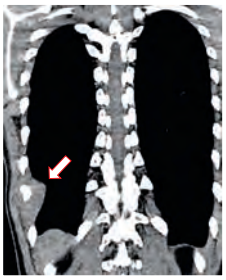
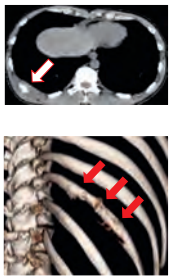
11 years later

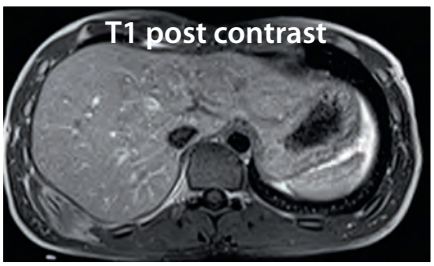


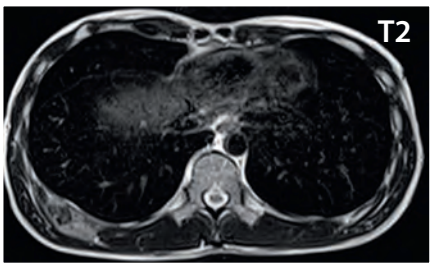
Case 7

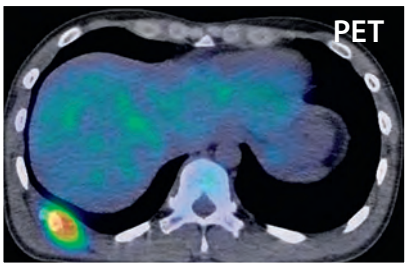
T. Nishisho, B. Hoch
Tokushima University, Tokushima, Japan; University of Washington, Seattle, WA, USA

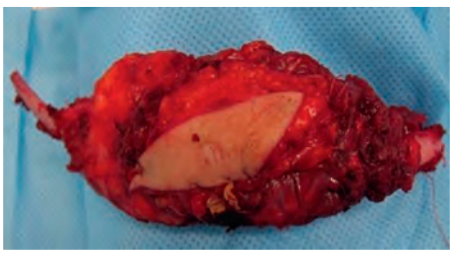
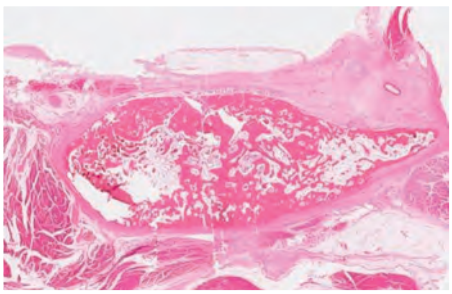
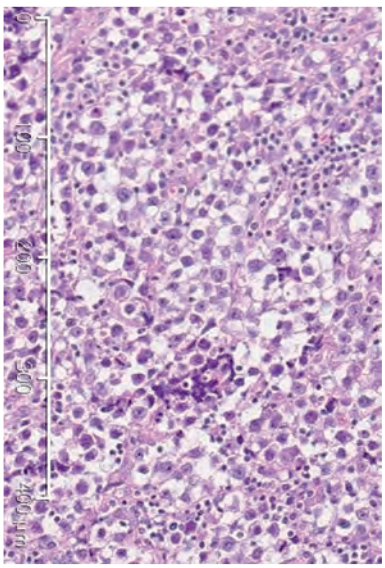
A 30 year old male with a 3-month history of right back pain and has palpable swelling of his right chest; past medical history includes Crohn Disease.





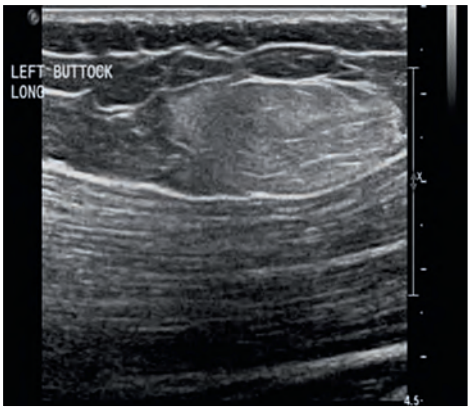


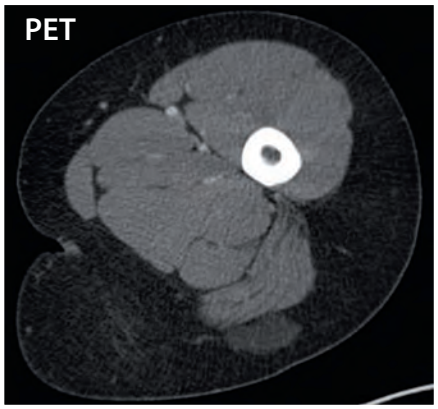





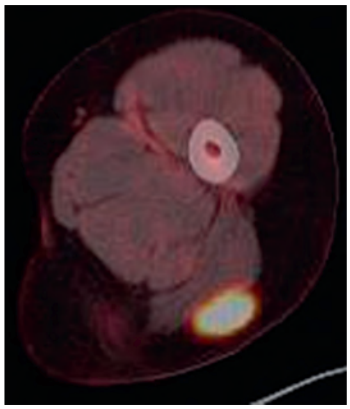
Case 8

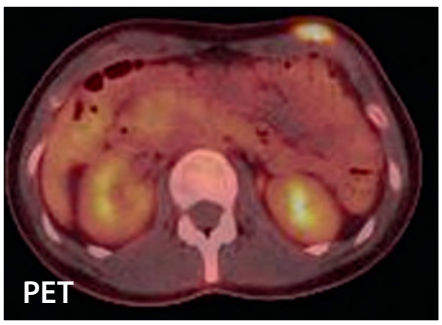
M. Murphey, J. C. Fanburg-Smith, A. Zaklama
American Institute for Radiologic Pathology, Silver Spring,
National Academic Pathology, McLean, VA and National Institutes of Health, Bethesda, MD, USA

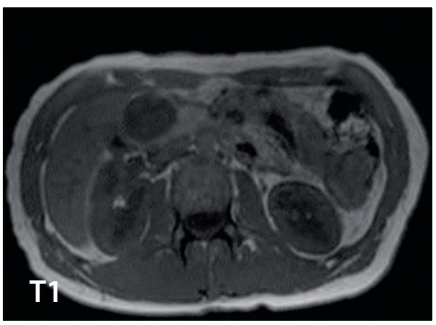
A 26 year old male with a strong family history of multiple endocrine neoplasia (MEN) type 1 presents with subcutaneous soft tissue masses.

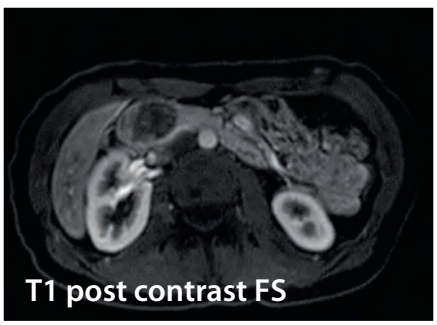


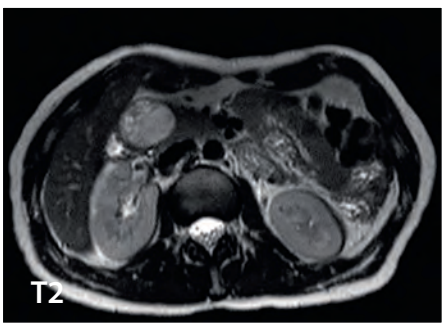


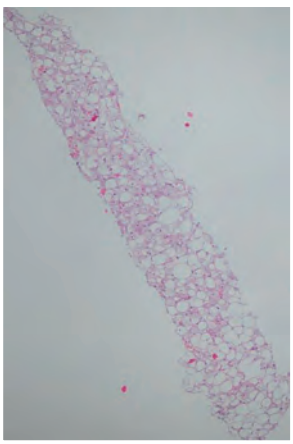


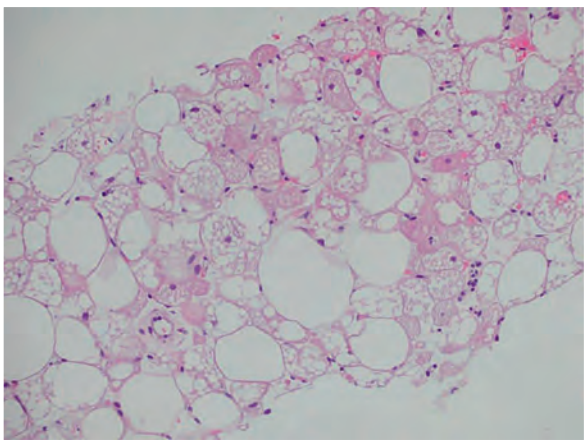












Members' Meeting

Day 3

AUGUST 2017						
Sat 26	Sun 27	Mon 28	Tue 29	Wed 30	Thu 31	Fri 1

10:30 – 12:30

Session II:

Moderators: Ben Hoch, Kate Stevens

Case Presentations

10:30 **Case 9:** J. C. Fanburg-Smith, M. Murphey, A. Zaklama (National Academic Pathology, McLean, VA and National Institutes of Health, Bethesda, MD, USA)

10:45 **Case 10:** K. Kohashi, Y. Yamada, Y. Matsumoto, Y. Oda (Kyushu University, Fukuoka, Japan)

11:00 **Case 11:** H. Ozger, B. Bilgic, B. K. Sirin, B. Alpan, N. Baliyev, O. E. Aycan, (Acibadem University School of Medicine, Istanbul, Turkey)

11:15 **Case 12:** S. Hwang, D. Ramirez, E. Athanasian, M. Hameed (Memorial Sloan Kettering, New York, NY, USA)

11:30 – 12:30

The Founders' Lecture

Honoring Dr. Michael J. Klein, Pathologist in Chief and Director, Department of Pathology and Laboratory Medicine, Hospital for Special Surgery, Professor of Pathology and Laboratory Medicine, Weill Medical, College of Cornell University, Consultant, Memorial Sloan-Kettering, Cancer Center and Memorial Hospital for Cancer and Allied Diseases, New York, NY, USA

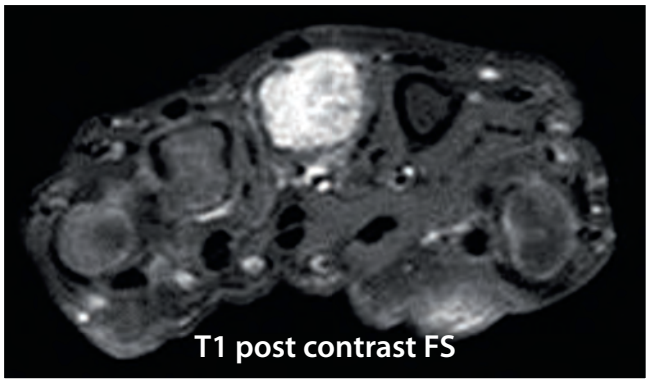
Presented by Dr. Fiona Bonar, Douglass Hanly Moir Pathology, Honorary Consultant Royal Prince Alfred Hospital, Adjunct Professor, University of Notre Dame Medical School, Sydney, Australia

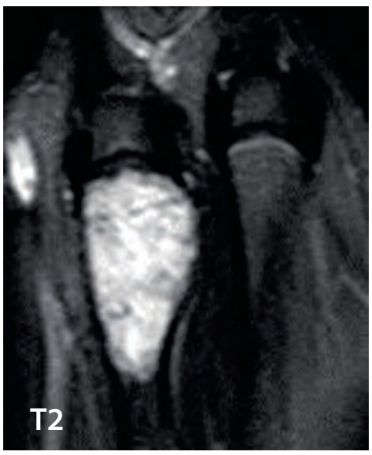
Giant Cell Lesions of the Craniofacial Skeleton: Current Concepts

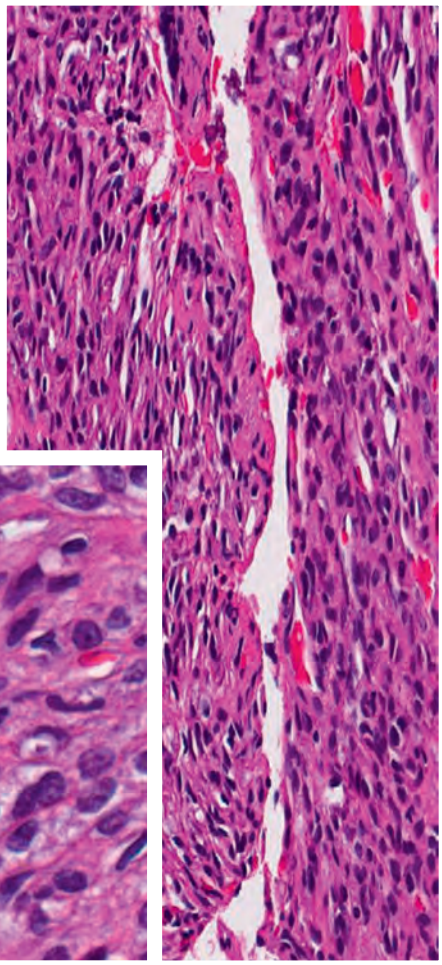
Case 9

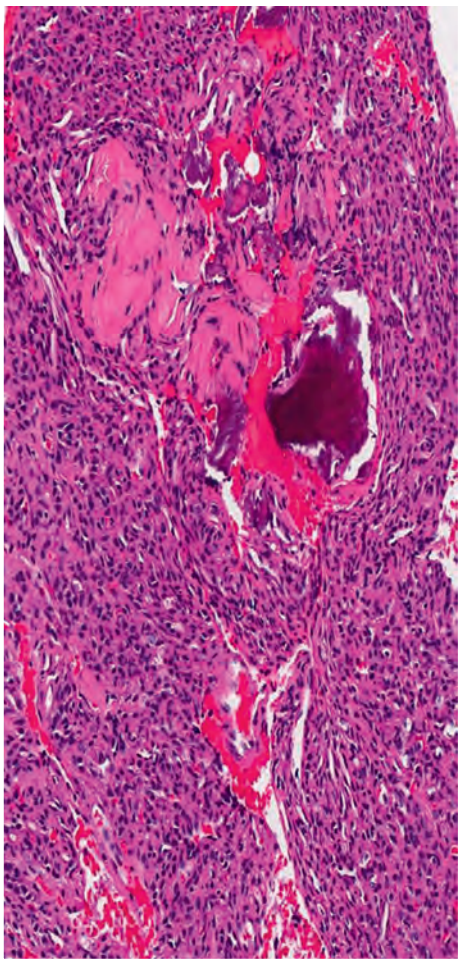
J. C. Fanburg-Smith, M. Murphey, A. Zaklama
National Academic Pathology, McLean, VA, American Institute for Radiologic Pathology, Silver Spring and National Institutes of Health, Bethesda, MD, USA

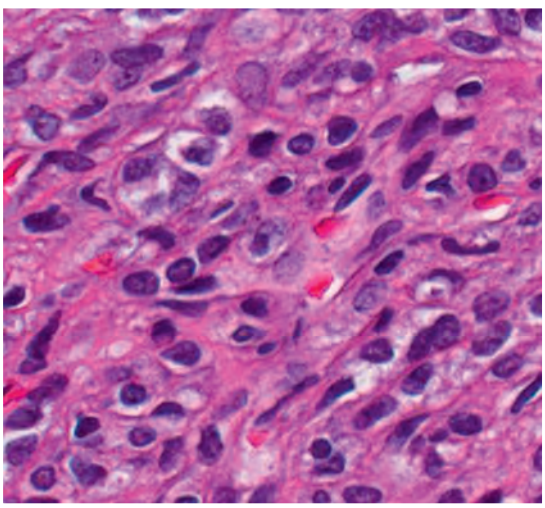
A 9 year old female presents with six months of hand pain.









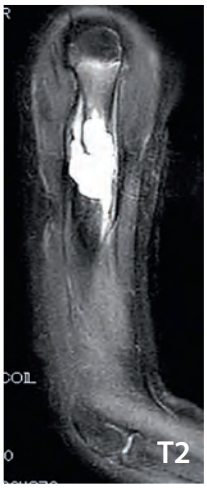


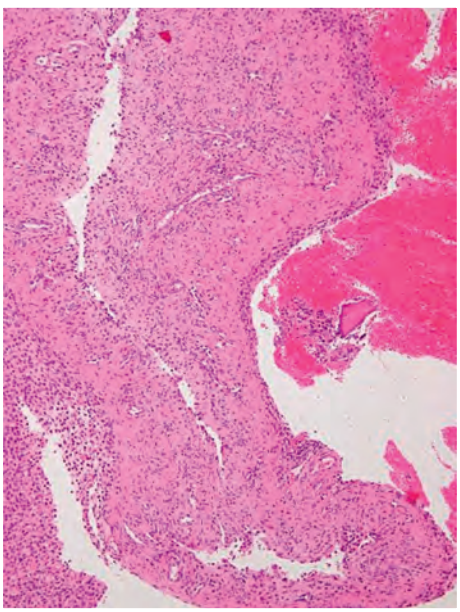
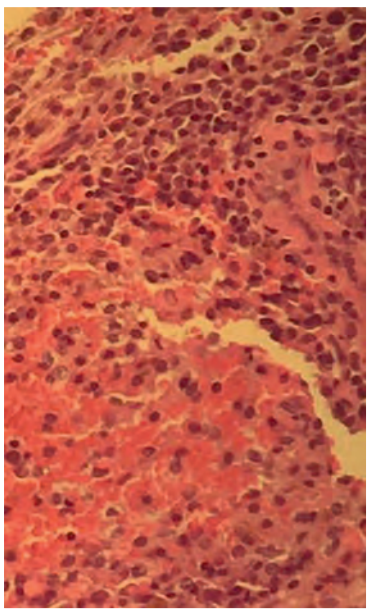
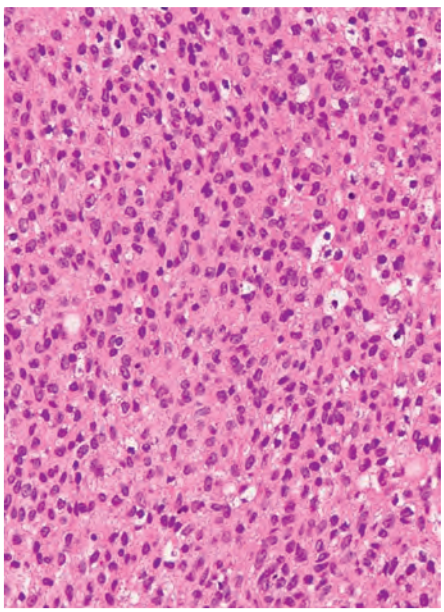
Case 10

K. Kohashi, Y. Yamada, Y. Matsumoto, Y. Oda
Kyushu University, Fukuoka, Japan

A 14 year old female presents with a fracture of the right humeral shaft during handball throwing. Thought to be a cyst, treatment was minimal and four months later osteolysis remained.



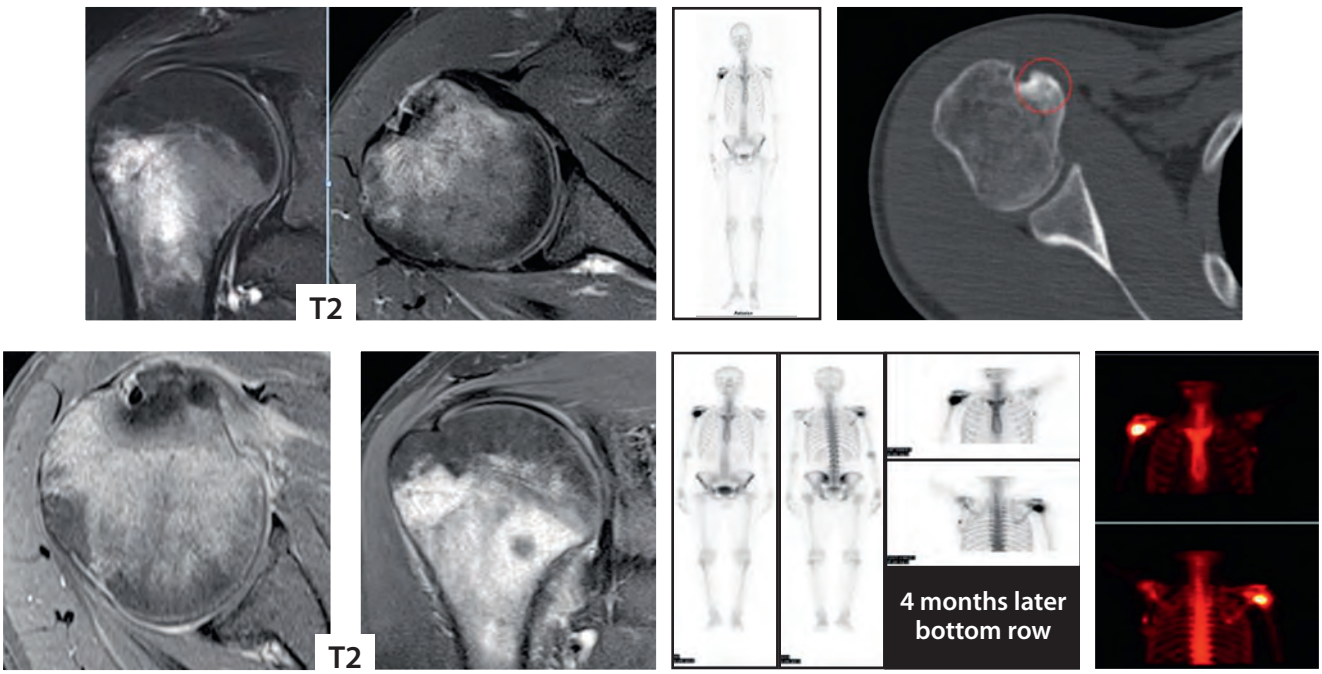


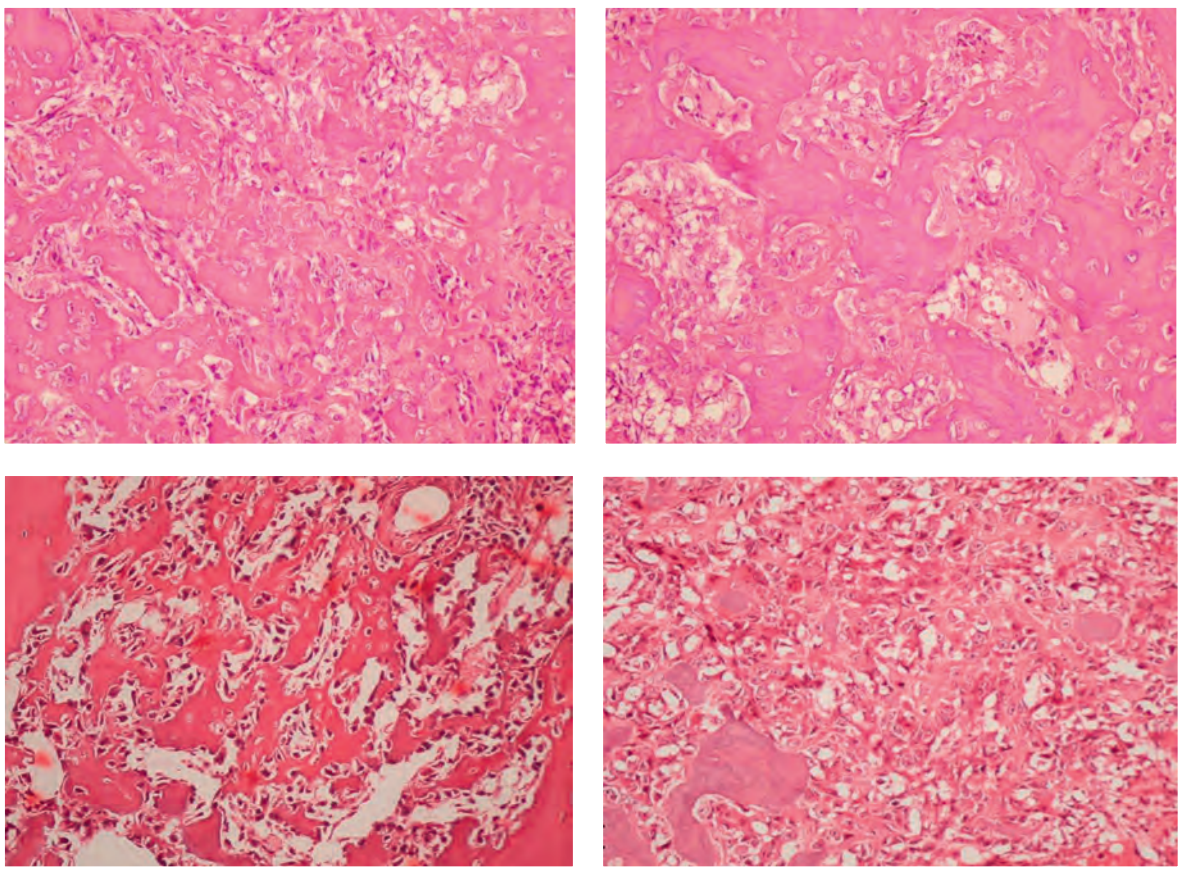




Case 11

H. Ozger, B. Bilgic, B.K. Sirin, B. Alpan, N. Baliyev, O.E. Aycan
Acibadem University School of Medicine, Istanbul, Turkey

A 27 year old male Cardiology resident with right shoulder night pain, responds to NSAIDs.

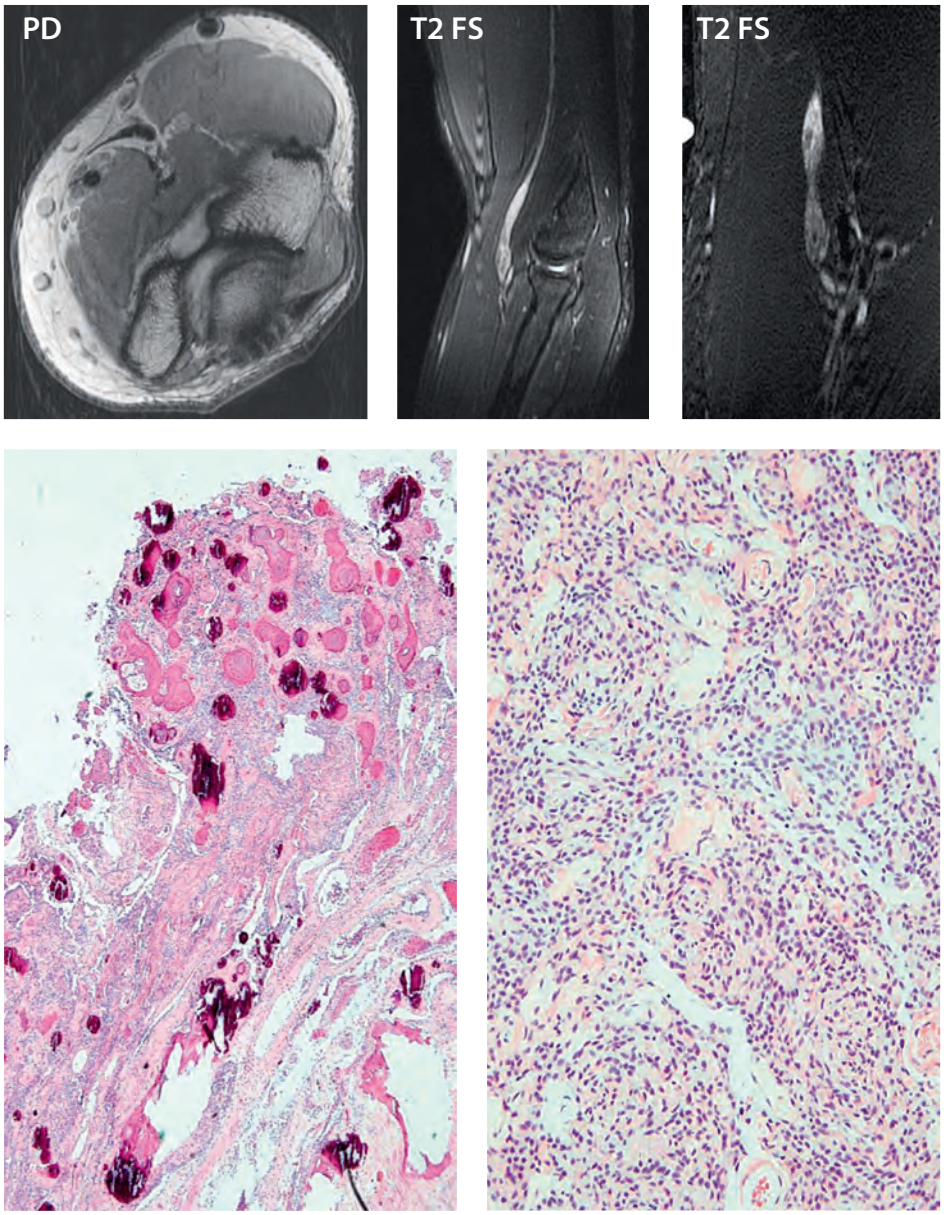




Case 12

S. Hwang, D. Ramirez, E. Athanasian, M. Hameed
Memorial Sloan Kettering, New York, NY, USA

A 16 year old male with left radial nerve motor symptoms.



Members' Meeting

Day 3

AUGUST 2017						
Sat 26	Sun 27	Mon 28	Tue 29	Wed 30	Thu 31	Fri 1

01:30 – 03:30

Session III:

Moderators: Adrienne Flanagan, Lynne Steinbach

Case Presentations

01:30 **Case 13:** E. McCarthy
(Johns Hopkins Hospital, Baltimore, MD, USA)

01:45 **Case 14:** R. Schneider, E. DiCarlo
(Hospital for Special Surgery, New York, NY, USA)

02:00 **Case 15:** S. Kenan, L. Kahn, D. Walz, D. Savant, S. Kenan
(Northwell Long Island Jewish, New Hyde Park, NY, USA)

02:15 **Case 16:** M. Gamarotti, A. Righi, D. Vanel
(Rizzoli Institute, Bologne, Italy)

02:30 **Case 17:** K. Stevens, A. Horvai, A. Perry
(Stanford, Palo Alto, CA and University of California
San Francisco, CA, USA)

02:45 **Case 18:** A. Franchi, A. Garaventa, B. Michelis, G. Roselli, R. Capanna
(University of Florence, Florence, Italy)

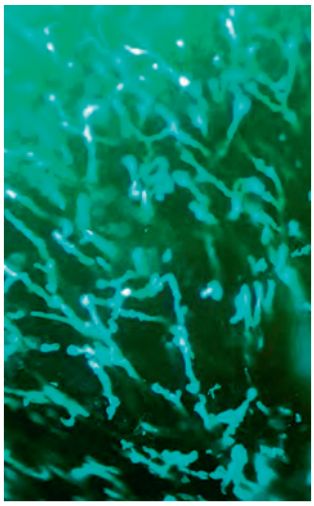
03:00 **Case 19:** M. Klein, D. Ramirez, R. Schneider
(Hospital for Special Surgery, New York, NY, USA)

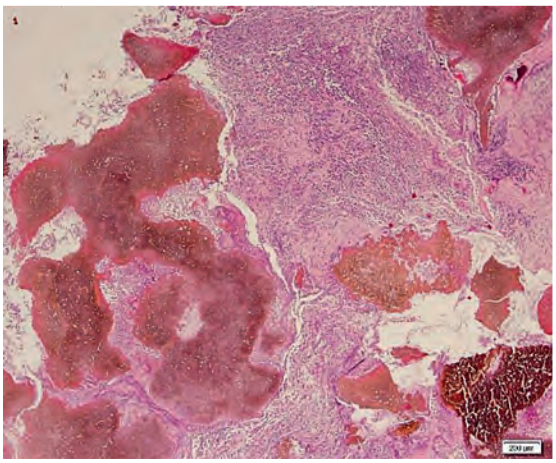
03:15 **Case 20:** J. Meis, K. McEnery
(MD Anderson, Houston, TX, USA)

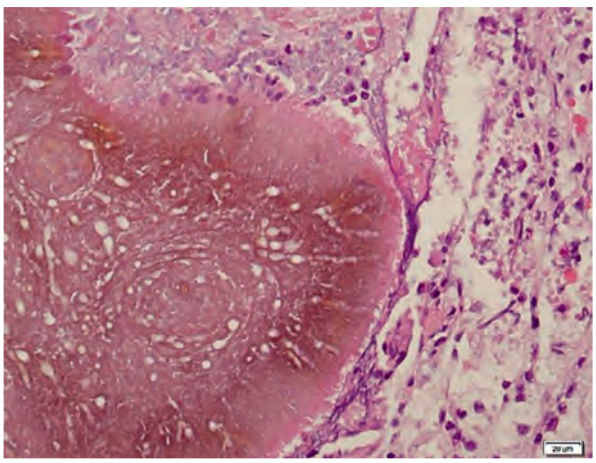
Case 13

E. McCarthy
Johns Hopkins Hospital, Baltimore, MD, USA

A 9 year old female from Sudan dropped a rock on her toe. A day later, she developed a draining sinus track that did not improve with wound care.



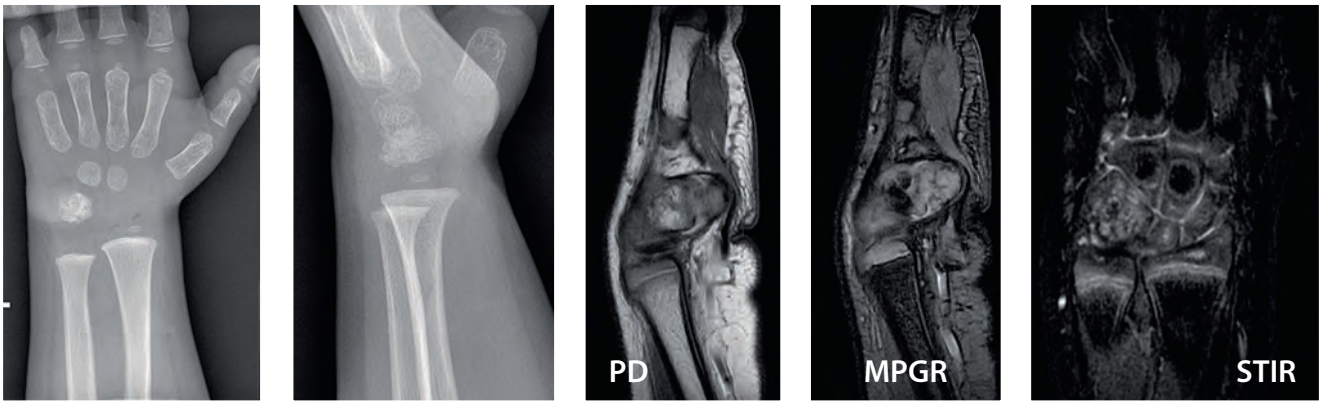


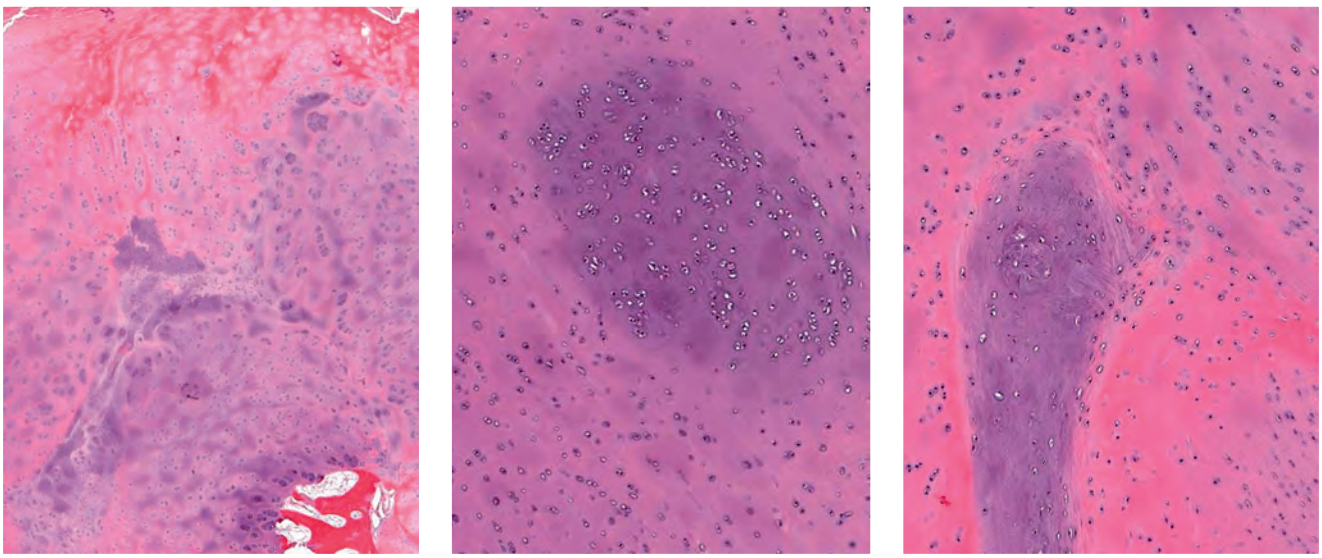


Case 14

R. Schneider, E. DiCarlo
Hospital for Special Surgery, New York, NY, USA

A 4 year old female with prominence of the ulnar aspect of the wrist.

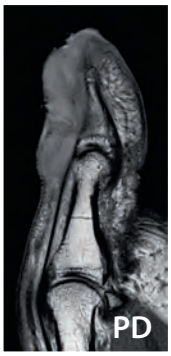


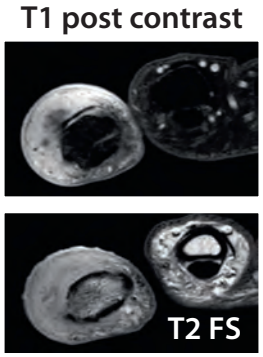


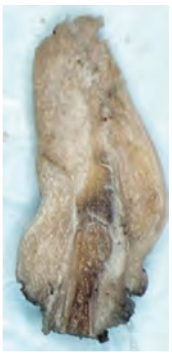
Case 15

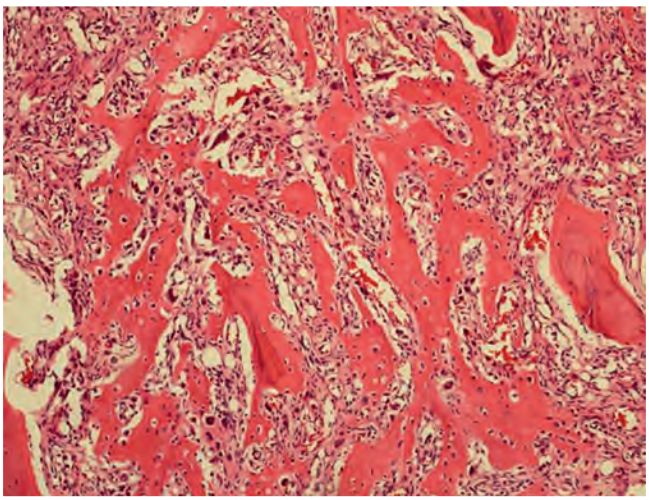
S. Kenan, L. Kahn, D. Walz, D. Savant, S. Kenan
Northwell Long Island Jewish, New Hyde Park, NY, USA

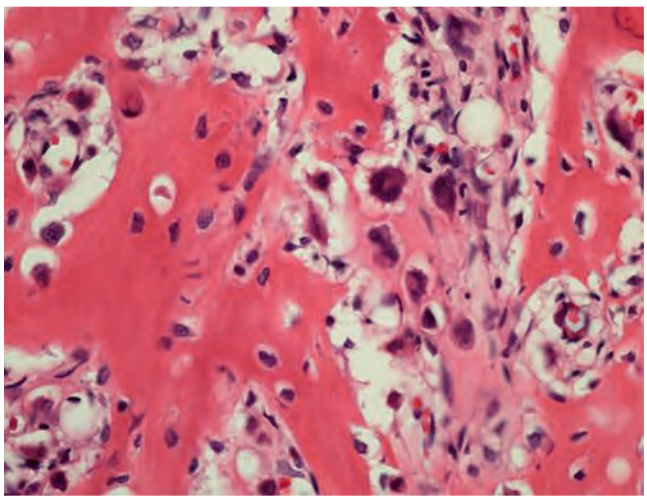
A 32 year old male presents with a subungual inflammatory ulceration of the right thumb nail bed and no history of trauma. Biopsy after six months of persistent thickening was inconclusive. The area continues to appear inflammed a year later.

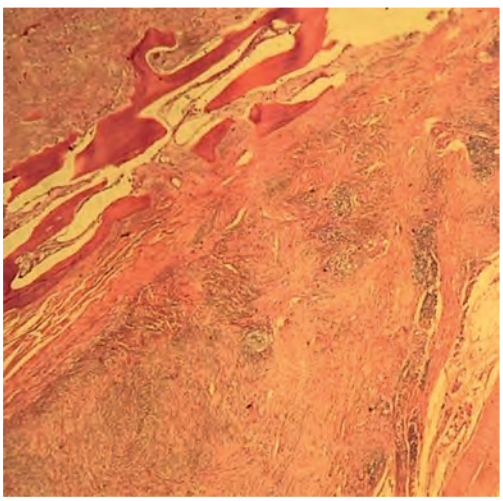


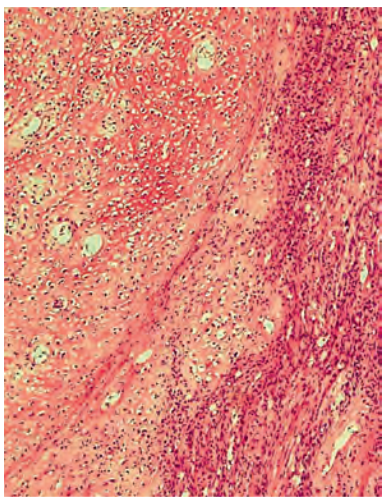


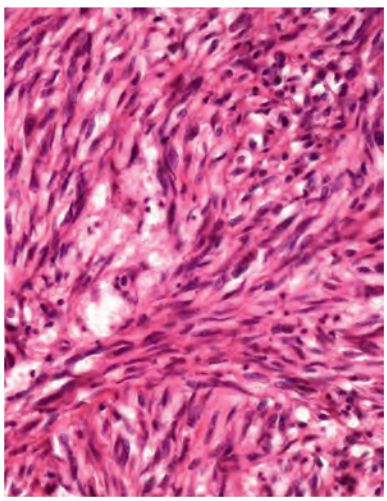








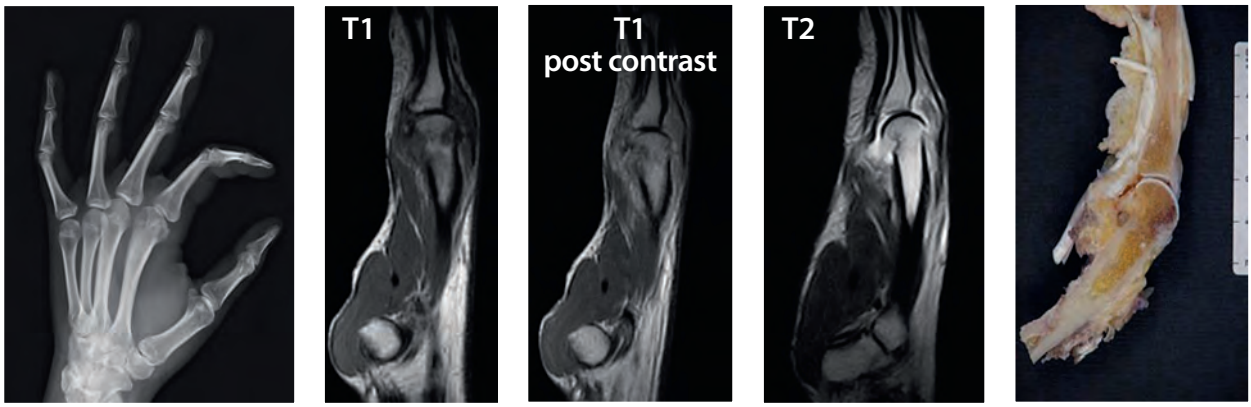


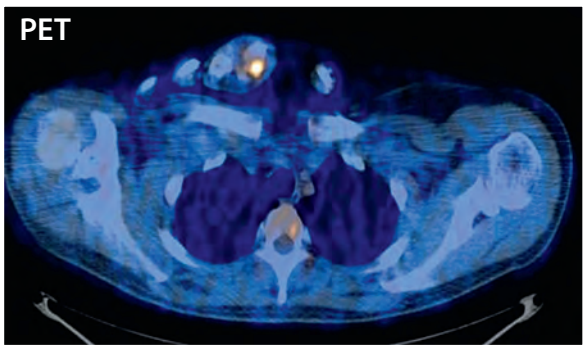


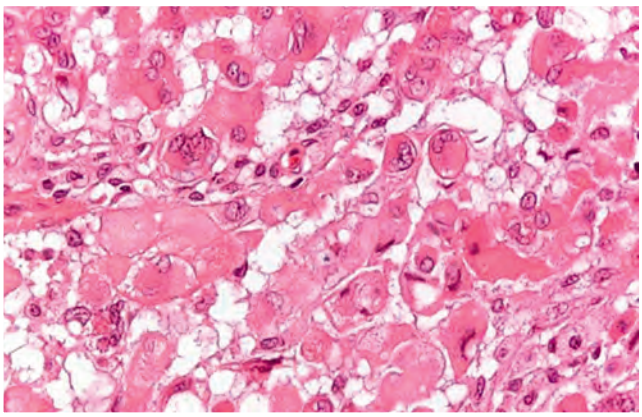
Case 16

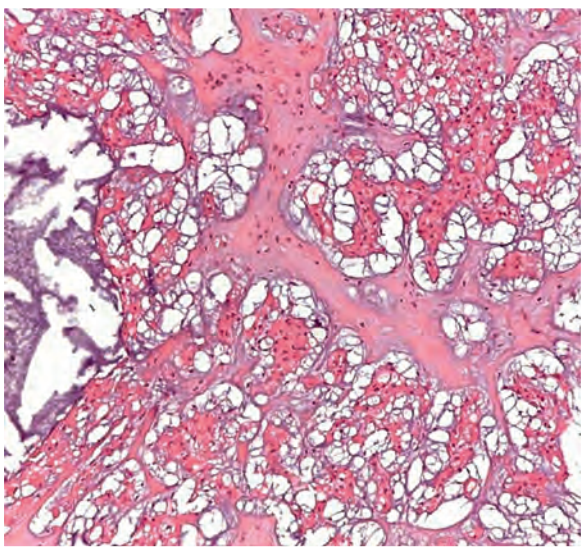
M. Gamarotti, A. Righi, D. Vanel
Rizzoli Institute, Bologne, Italy

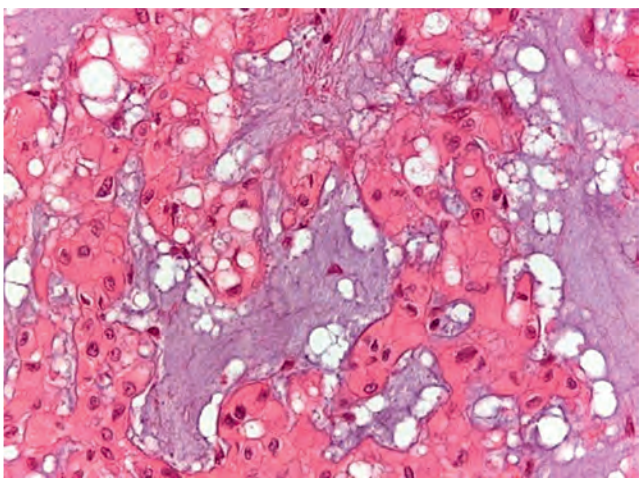
A 20 year old male presents with one year of isolated pain and swelling of the hand.







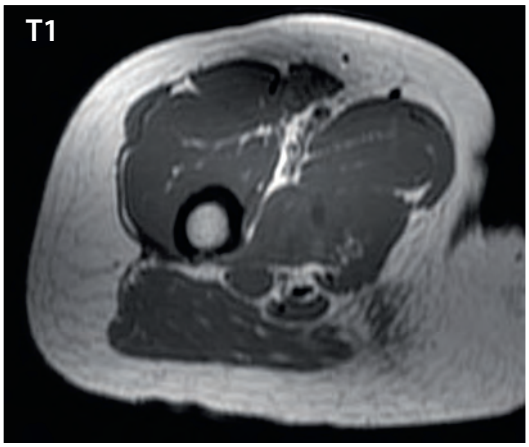


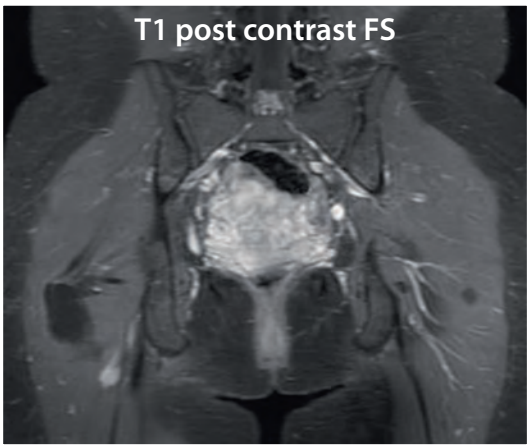


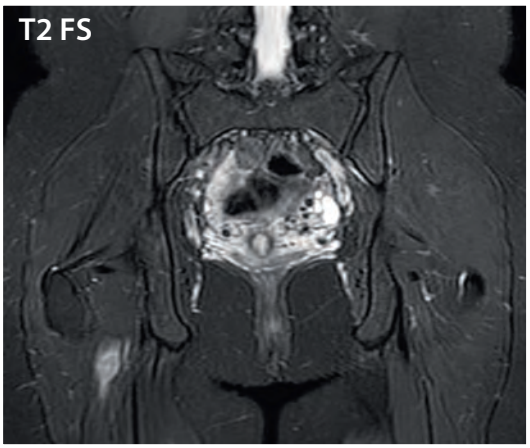
Case 17

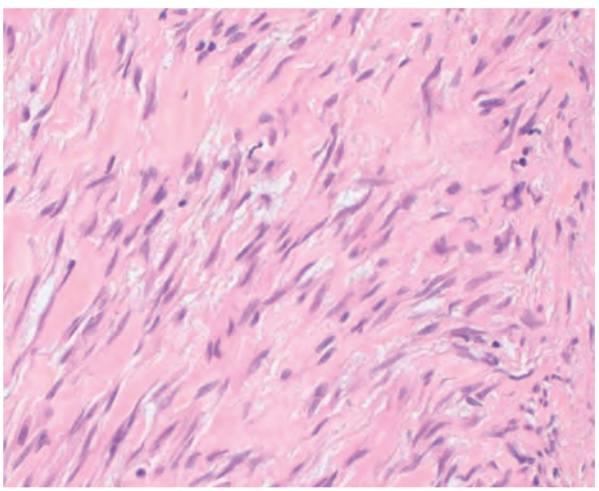
K. Stevens, A. Horvai, A. Perry
Stanford, Palo Alto, CA and University of California San Francisco, CA, USA

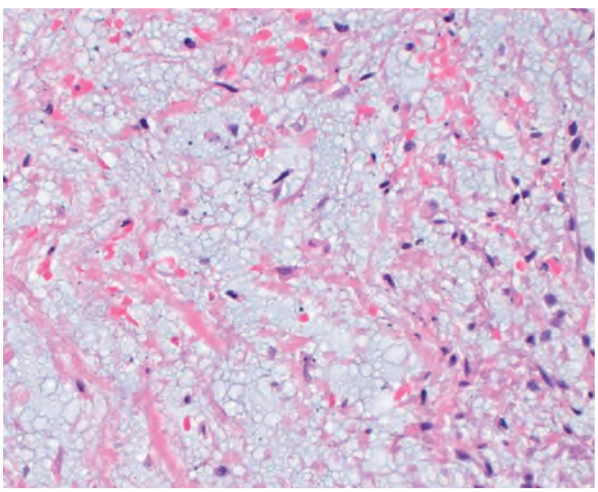
A 30 year old female with an 8 month history of progressive burning right-sided S1 radicular pain, radiating from the buttock into her right foot. Intractable pain was unresponsive to bedrest, physical therapy, chiropractic manipulation, acupuncture or antiinflammatory or pain medication.







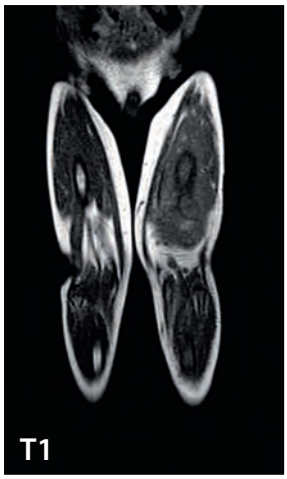


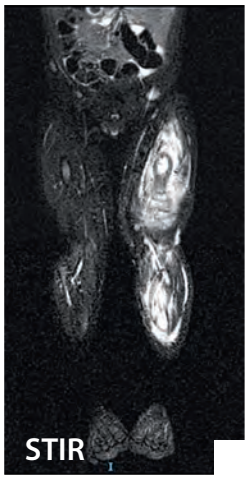


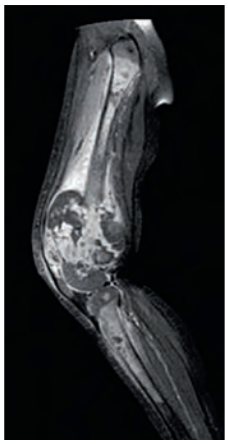
Case 18

A. Franchi, A. Garaventa, B. Michelis, G. Roselli, R. Capanna
University of Florence, Florence, Italy

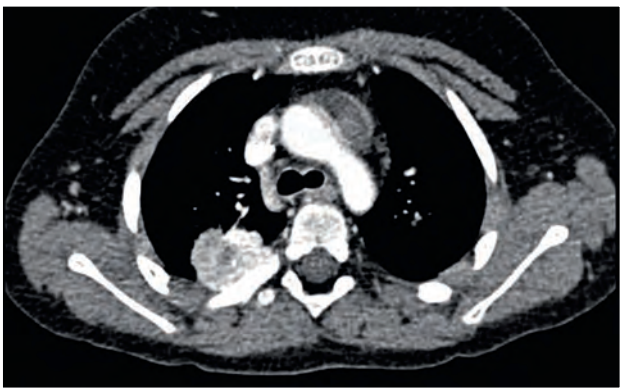
A 3 year old male presents with a one month history of left lower limb pain and swelling of the ipsilateral knee. He had multple hemangiomas at birth and a new space-occupying lesion of the chest and brain, which decreased in size over time.

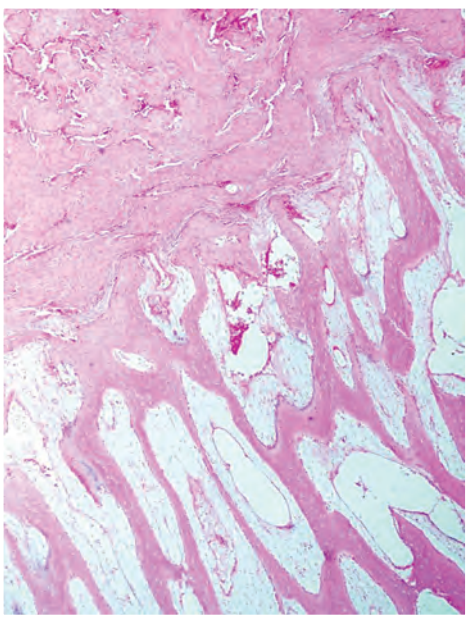


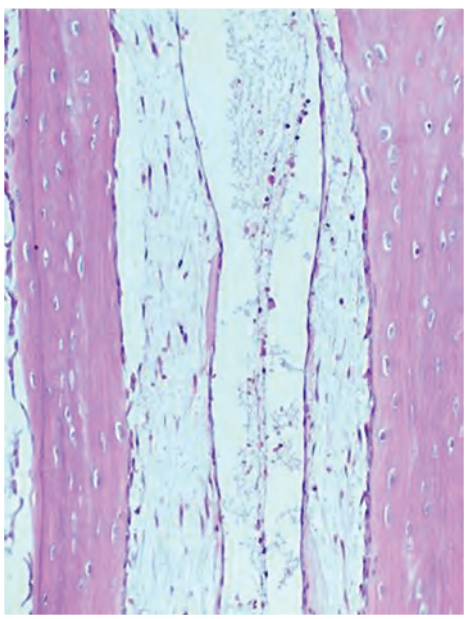




T1 post contrast FS



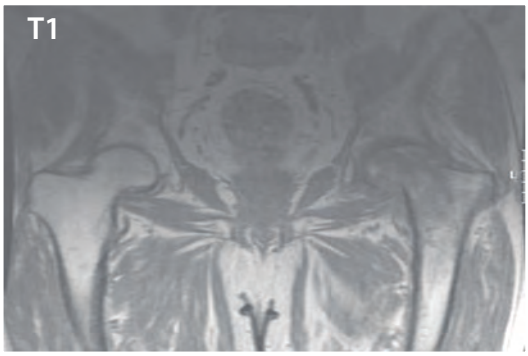


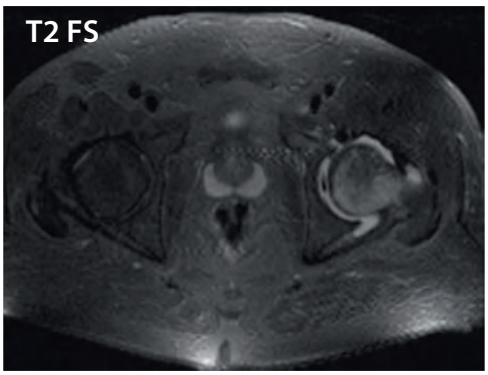


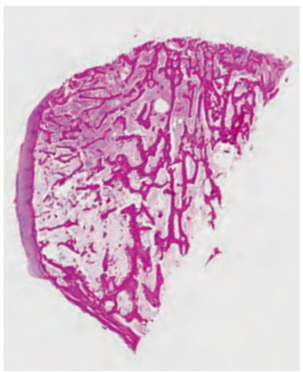
Case 19

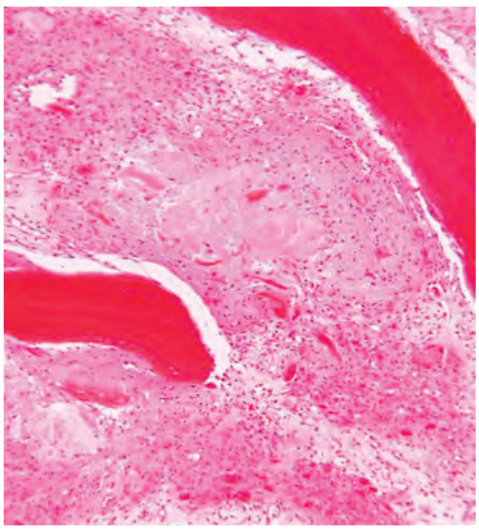
M. Klein, D. Ramirez, R. Schneider
Hospital for Special Surgery, New York, NY, USA

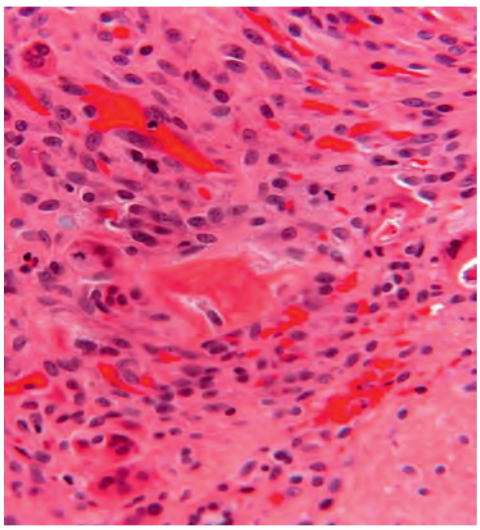
A 68 year old male presents with an 8 month history of progressive left hip pain.







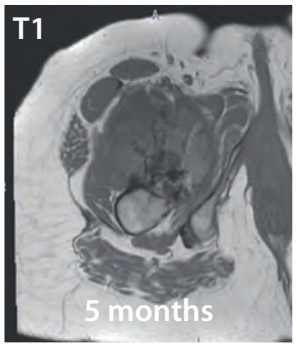


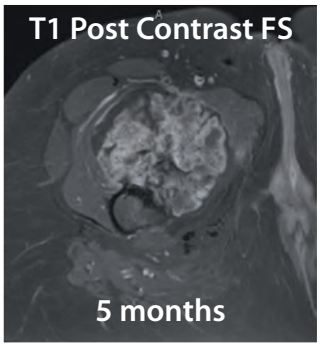


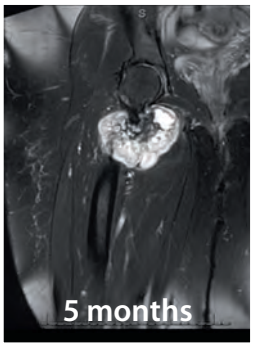
Case 20

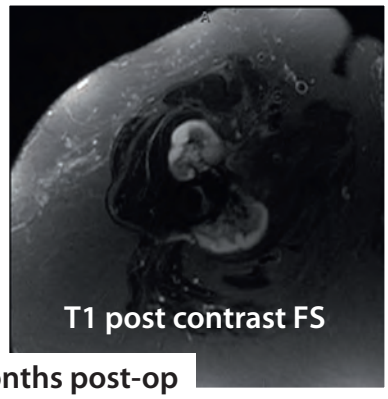
J. Meis, K. McEnery
MD Anderson, Houston, TX, USA

A 57 year old female presents with 3 months of proximal thigh swelling and increasing hip pain. Radiographs demonstrated a right femur lesion (3 months); MRI revealed a proximal femoral lesion (5 months) and a lesion with IM nail and femoral neck screw was excised (6 months).

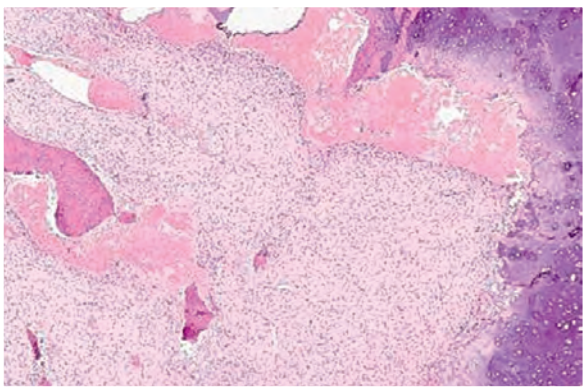


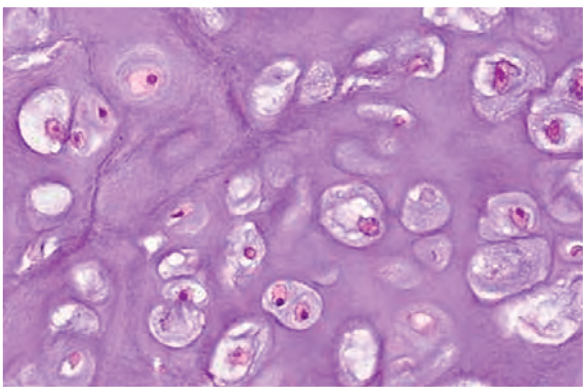


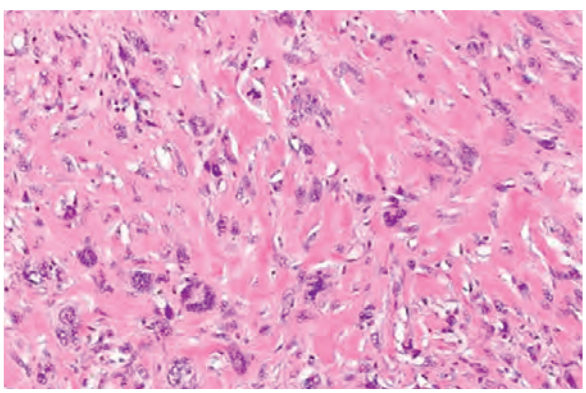


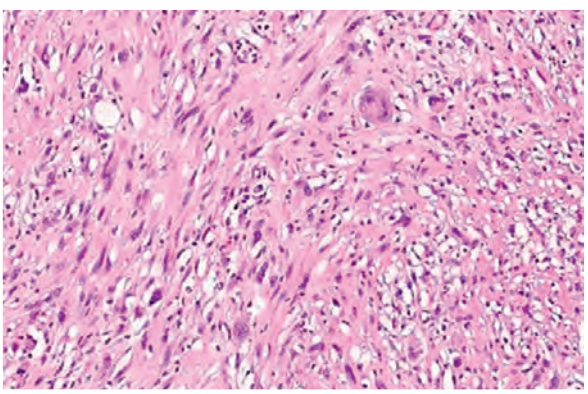


18 months post-op









Members' Meeting

Day 3

AUGUST 2017						
Sat 26	Sun 27	Mon 28	Tue 29	Wed 30	Thu 31	Fri 1

04:00 – 05:00

Session IV:

Moderators: Meera Hameed, David Panicek

Case Presentations

04:00 **Case 21:** A. Rosenberg, T. Subhawong
(University of Miami Hospital, Miami, FL, USA)

04:15 **Case 22:** J. Kreshak, D. Vanel, A. Righi, P. Dei Tos, S. Boriani
(Harvard Medical School, Boston, MA, USA and
Rizzoli Institute, Bologna, Italy)

04:30 **Case 23:** Y. Kobashi, U. Anazawa
(Ichikawa General Hospital Ichikawa, Japan)

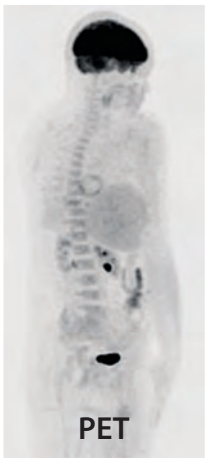
04:45 **Case 24:** D. Baumhoer, A. Hirshmann, D. Harder
(University Hospital Basel, Basel, Switzerland)

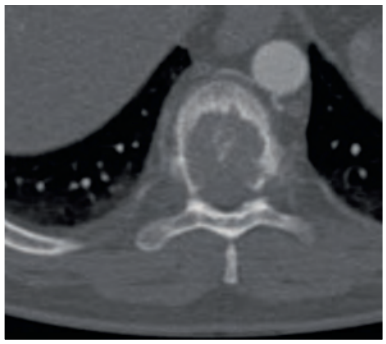
05:10 – 06:10 **Electronic powerpoint presentations** (see page 42)

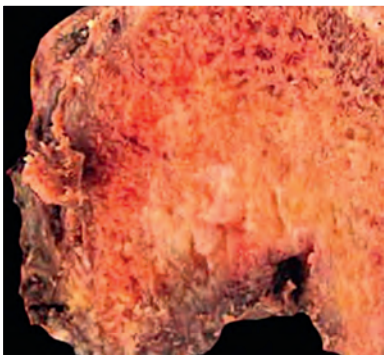
Case 21

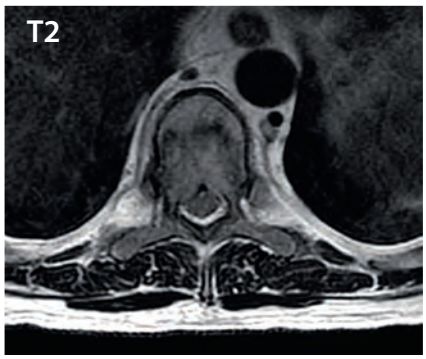
A. Rosenberg, T. Subhawong
University of Miami Hospital, Miami, FL, USA

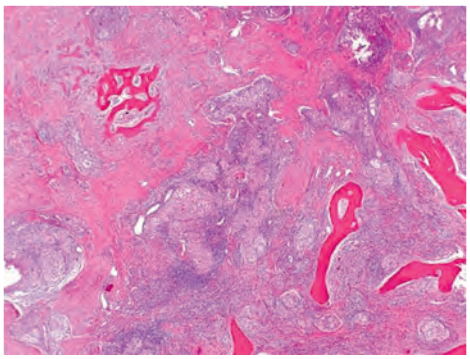
A 51year old male presents with a 4-month history of progressively worsening thoracic back pain, described as "stabbing" and "aching" with diminished reflexes in the biceps, triceps, patellar and Achilles tendons by physical examination. Medical history was otherwise unremarkable.

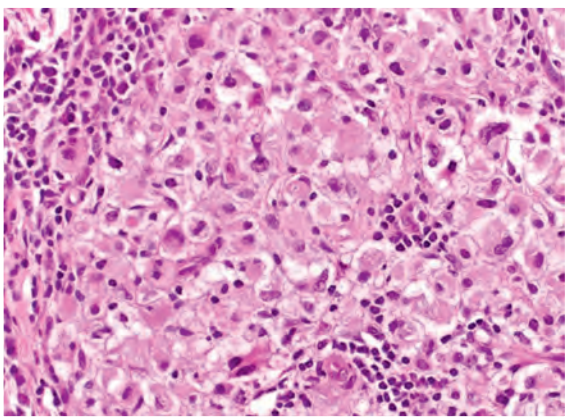


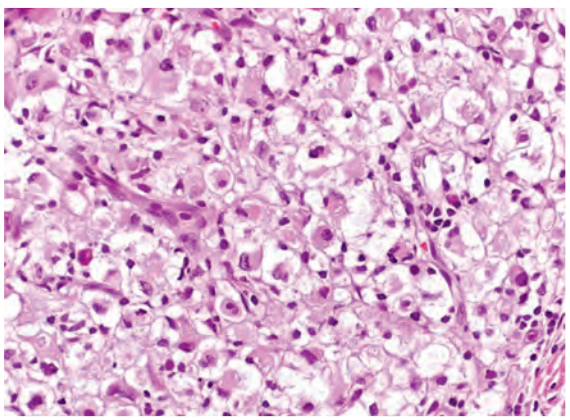








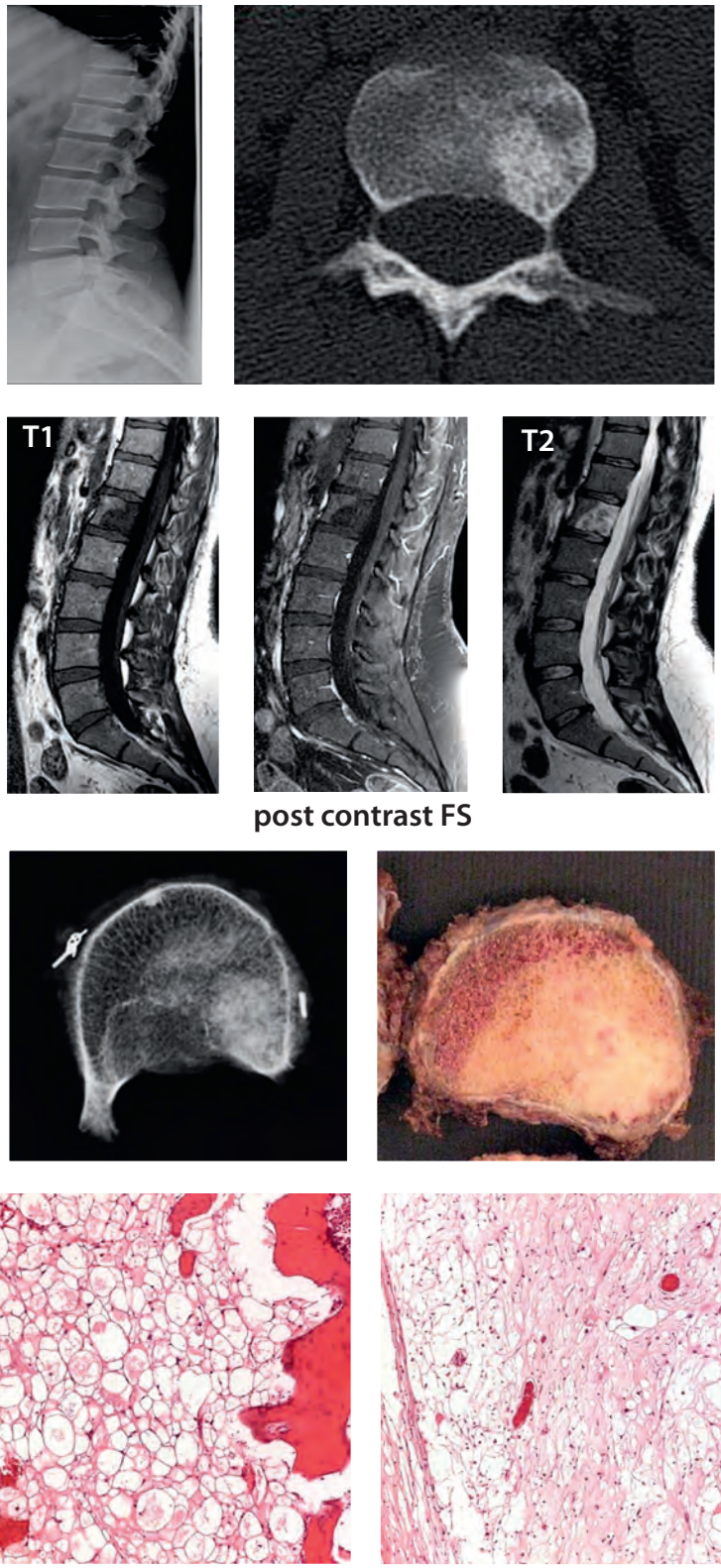




Case 22

J. Kreshak, D. Vanel, A. Righi, P. Dei Tos, S. Boriani
Harvard Medical School, Boston, MA and Rizzoli Institute, Bologna, Italy

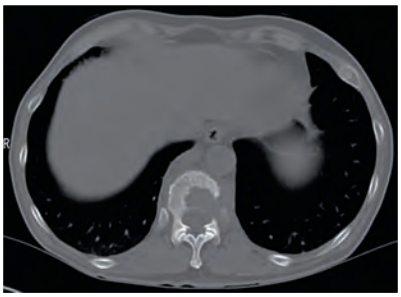
A 32 year old female presents with back pain.

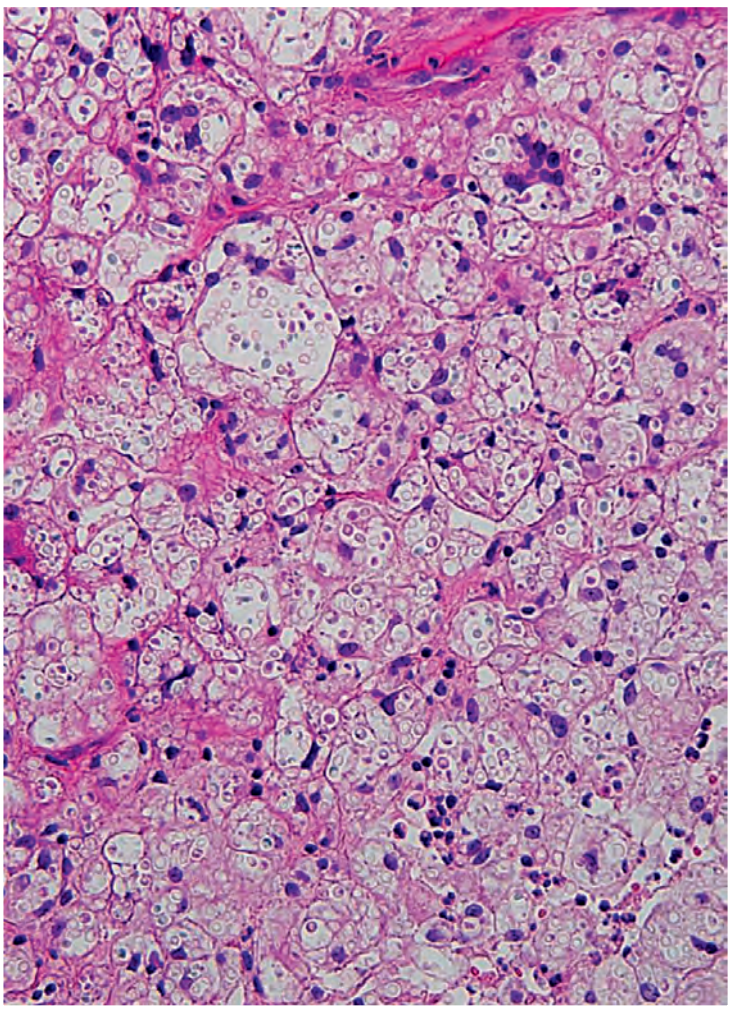


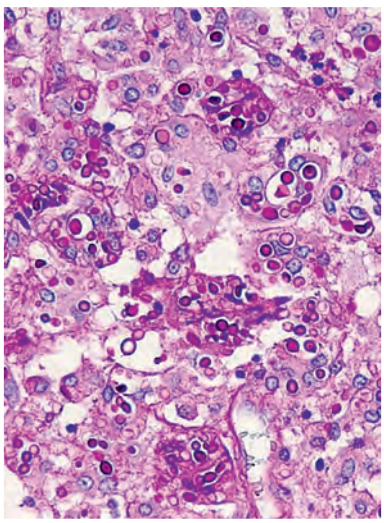
Case 23

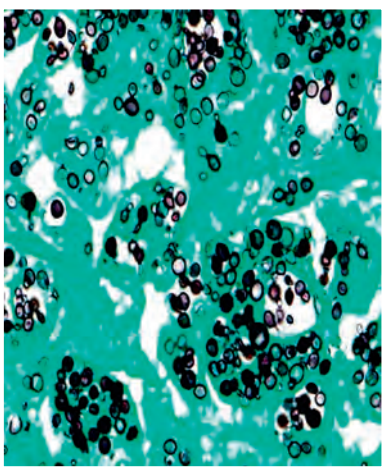
Y. Kobashi, U. Anazawa
Ichikawa General Hospital Ichikawa, Japan

A 71 year old male presents with numbness in both lower extremities. There was a history of Waldenstrom Macroglobulinemia; a chest CT showed a lung nodule and bone destruction at T12.





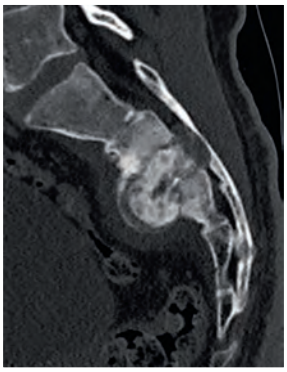
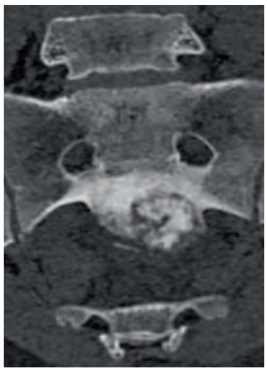
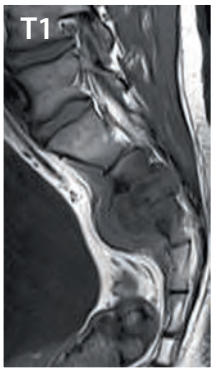


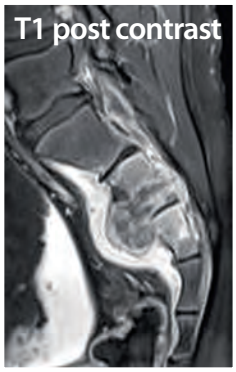


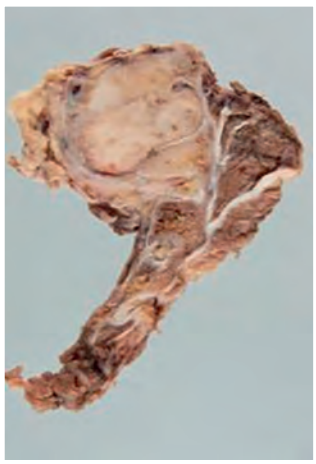
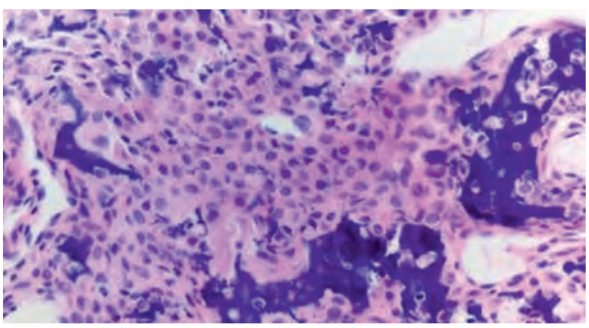
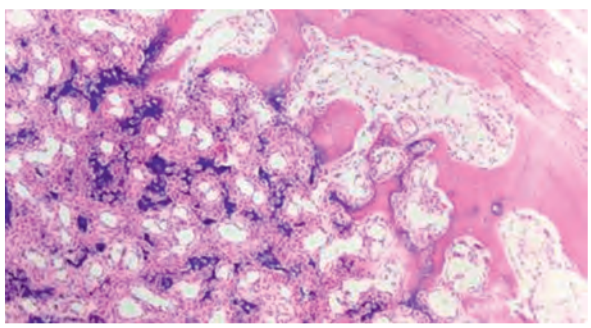
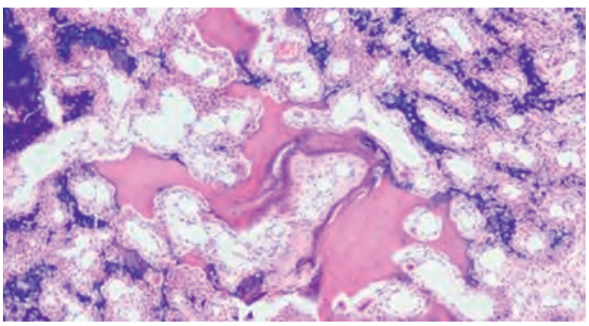
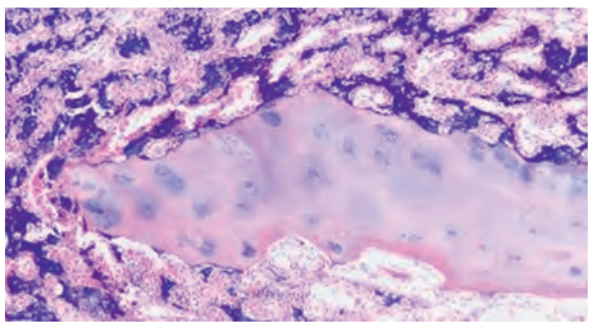
Case 24

D. Baumhoer, A. Hirshmann, D. Harder
University Hospital Basel, Basel, Switzerland

A 17 year old male presents with a 12-month history of pain in the lumbosacral area, a few months after a judo fight accident, with no chiropractic relief.



Electronic PowerPoint Presentations (10 minutes each)

Monday, August 28th, 2017 / 05:10 PM – 06:10 PM

Group 1

Moderators: Andreas Heuck, Frederic Lecouvet, Meera Hameed, Darius Borys

		Group	Time PM
E1	**R. Ricciotti, A. Ha, B. Hoch** University of Washington / Seattle, WA, USA	*Group 1A*	*05:10 – 05:20*
E6	**I. Boulytcheva, A. Fedorova, Y. Schipachina, N. Kochergina, D. Wenger** Blochin Cancer Research Center and Mayo Center / Moscow and Rochester, Russia and USA	*Group 1B*	*05:20 – 05:30*
E7	**I. Boulytcheva , A. Fedorova, Y. Schipachina, N. Kochergina** Blochin Cancer Research Center / Russia	*Group 1C*	*05:30 – 05:40*
E12	**L. Steinbach, T. Link, A. Horvai** University of California San Francisco / San Francisco, CA, USA	*Group 1D*	*05:40 – 05:50*
E24	**I. Iofin, G. Hermann, R. García** Icahn School of Medicine at Mount Sinai and Hospital for Special Surgery / New York, NY, USA	*Group 1E*	*05:50 – 06:00*

Group 2

Moderators: Philip Robinson, Valerie Bousson, Carrie Inwards, Leonard Kahn

		Group	Time PM
E2	**V. Bousson, M. Polivka, M. P. Loit, M. Labidi, J. D. Laredo** Hôpital Lariboisière / Paris, France	*Group 2A*	*05:10 – 05:20*
E13	**K. Mehta, M. Mcbee, E. England, D. Leino, R. Wissman** Cincinnati Children's Hospital / Cincinnati , OH, USA	*Group 2B*	*05:20 – 05:30*
E18	**Y. Zhang, C. Winalski** Cleveland Clinic / Cleveland, OH, USA	*Group 2C*	*05:30 – 05:40*
E19	**M. G. Sebaaly, G. Maroun, A. Tawil, R. Haidar, N. J. Khoury Cura** American University of Beirut / Beirut, Lebanon	*Group 2D*	*05:40 – 05:50*
E25	**T. Akiyama, T. Yamaguchi, H. Imada** Saitama Medical Center and Koshigaya Hospital, Dokkyo Medical University / Saitama, Japan	*Group 2E*	*05:50 – 06:00*

Group 3

Moderators: Mark Murphey, Michael Recht, Mike Klein, Takehiko Yamaguchi

		Group	Time PM
E3	**S. Aisner, M. Blacksin, C. Curcio, J. Nuttall, K. Beebe** Rutgers New Jersey Medical School / Newark, NJ, USA	*Group 3A*	*05:10 – 05:20*
E16	**J. Rassi, T. Bauer, K. Greene, H. Ilaslan, M. Sundaram, N. Subhas** Cleveland Clinic / Cleveland, OH, USA	*Group 3B*	*05:20 – 05:30*
E20	**D. Pastore, D. Resnick, A. Filho, F. Silva, F. Albertotti, M. Gonzalez, X. Stump, M. Freitas, T. Santos, M. Nico** Fleury / Sao Paulo, SP, Brazil	*Group 3C*	*05:30 – 05:40*
E22	**H. Imada, T. Yamaguchi, H. Sato** Koshigaya Hospital and Saiseikai Kawaguchi General Hospital / Saitama, Japan	*Group 3D*	*05:40 – 05:50*
E23	**R. V. P de Villiers, B. Barnard, M. van Heukelum, X. Wang, J. U. V. Monu** Winelands Radiology, University of Stellenbosch, University of Rochester / Capetown, Western Cape, South Africa	*Group 3E*	*05:50 – 06:00*

Group 4

Moderators: Tobias Dietrich, David Panicek, Daniel Baumhoer, Bogdan Czerniak

		Group	Time PM
E4	**D. Borys, M. Bednar, L. Nystrom, A. Song, L. Lomasney** Loyola University / Chicago, IL, USA	*Group 4A*	*05:10 – 05:20*
E10	**J. Kreshak, D. Vanel, J. Nshizirungu, R. Kalengayi, B. Rugwizangoga** Harvard Medical School, Instituto Ortopedico Rizzoli, King Faisal Hospital, University of Rwanda / Kigali, Rwanda	*Group 4B*	*05:20 – 05:30*
E11	**A. Crombe, Y. Carlier, F. Le Loarer, B. Dallaudiere, L. Pesquer** Clinique du Sport / Bordeaux, France	*Group 4C*	*05:30 – 05:40*
E21	**Y. Koo Park, K. Nam Ryu** Kyung Hee University Hospital / Seoul, Republic of Korea	*Group 4D*	*05:40 – 05:50*
E17	**A. Mahar, J. Schatz, P. Stalley, F. Bonar** Royal Prince Alfred Hospital and Douglass Hanly Moir Pathology / Sydney, Australia	*Group 4E*	*05:50 – 06:00*

Group 5

Moderators: Mark Kransdorf, Juerg Hodler, Julie Fanburg-Smith, Frederique Larousserie, Jasvir Khurana

		Group	Time PM
E5	**M. Suzuki, S. Ehara, Y. Suzuki, T. Satoh** Iwate Medical University / Iwate, Japan	*Group 5A*	*05:10 – 05:20*
E8	**J. S. Khurana, S. Ali, P. J. Zhang** Temple and University of Pennsylvania / Philadelphia, PA, USA	*Group 5B*	*05:20 – 05:30*
E9	**J. Craig, C. Scher, D. Chitale** Henry Ford Hospital / Detroit, MI, USA	*Group 5C*	*05:30 – 05:40*
E14	**M. Mulligan** University of Maryland / Baltimore, MD, USA	*Group 5D*	*05:40 – 05:50*
E15	**N. Haramati, E. Villanueva-Siles, D. S. Geller** Albert Einstein College of Medicine & Montefiore Medical Center / Bronx, NY, USA	*Group 5E*	*05:50 – 06:00*

Members' Meeting

Day 4

AUGUST 2017						
Sat 26	Sun 27	Mon 28	Tue 29	Wed 30	Thu 31	Fri 1

07:30 – 10:00

Session V:

Moderators: Mike Klein, Lawrence White

Case Presentations

07:30 **Case 25:** M. Hameed, S. Hwang, D. Prince
(Memorial Sloan Kettering, New York, NY, USA)

07:45 **Case 26:** A. Horvai, T. Link, L. Steinbach
(University of California, San Francisco, CA, USA)

08:00 **Case 27:** P. Odonnell, F. Amary, R. Tiraboasco, A. Flanagan
(Royal National Orthopedica Hospital, Stanmore, United Kingdom)

08:15 **Case 28:** S. Aisner, M. Blacksin, C. Curcio, J. Nuttall, F. Patterson
(Rutgers New Jersey Medical School, Newark, NJ, USA)

08:30 **Case 29:** M. Bordalo-Rodrigues, C. Regina de Oliveira, C. Kurimori, A. Batista, O. Camargo
(Universitiy of Sao Paulo Medical School and Hospital Sirio-Libanes, Sao Paulo, Brazil)

08:45 **Case 30:** E. DiCarlo, R. Schneider, M. Bansal
(Hospital for Special Surgery, New York, NY, USA)

09:00 **Case 31:** Z. Jibri, K. Rakhra, B. Purgina, J. Werier, M. Schweitzer
(Ottawa Hospital, Ottawa, Onario, Canada and Stony Brook University, Stony Brook, NY, USA)

09:15 **Case 32:** S. Kenan, L. Kahn, D. Walz, D. Savant, S. Kenan
(Northwell Long Island Jewish, New Hyde Park, NY, USA)

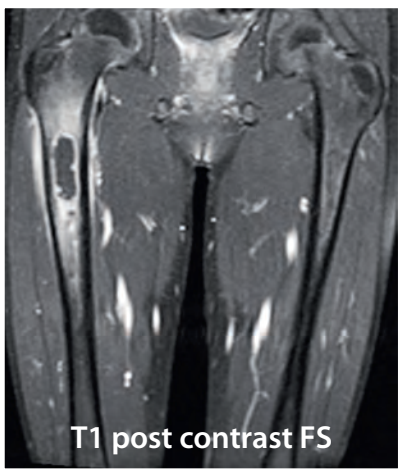
09:30 **Case 33:** R. Lalam, F. Amary, V. Pullicino, P. Tyrrell, P. Cool, D.C. Mangham
(Robert Jones and Agnes Hunt Orthopaedic Hospital, Owestry, United Kingdom)

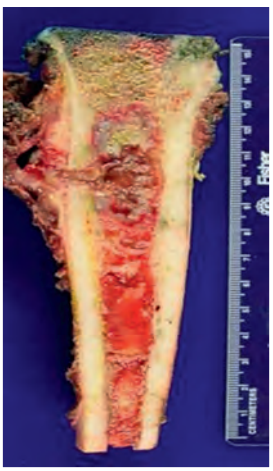
09:45 **Case 34:** R. Sutter, B. Bode, D. Mueller, C. Pfirrmann
(Balgrist University Hospital, Zurich, Switzerland)

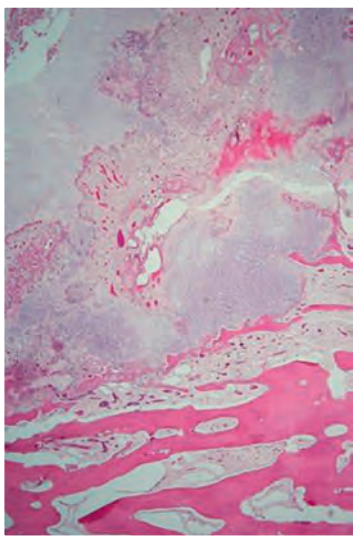
Case 25

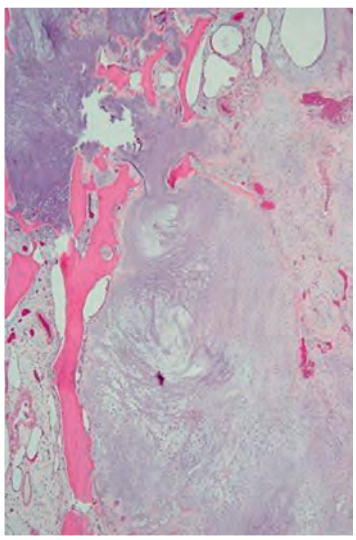
M. Hameed, S. Hwang, D. Prince
Memorial Sloan Kettering, New York, NY, USA

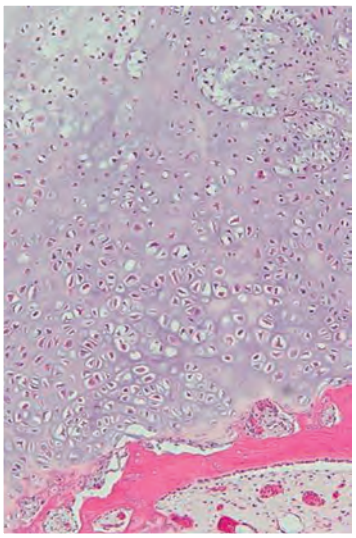
A 10 year old male presents with intermittent pain in the right thigh since the past year and a half.







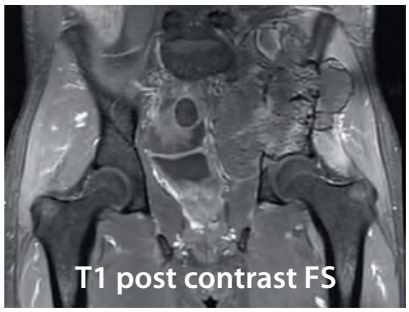


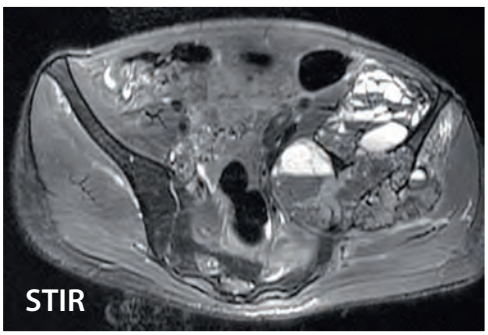


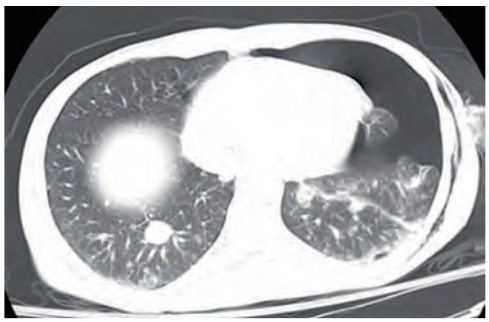
Case 26

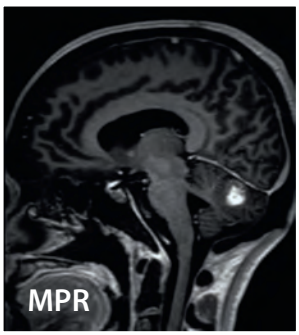
A. Horvai, T. Link, L. Steinbach
University of California, San Francisco, CA, USA

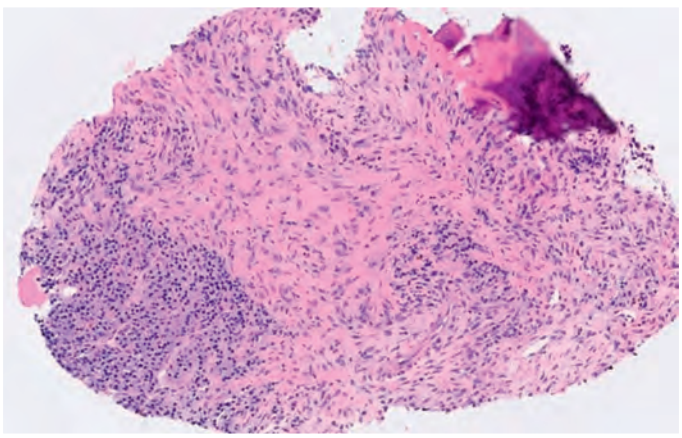
A 21 year old male presents with a left pelvic mass, fevers, weight loss, and anorexia.

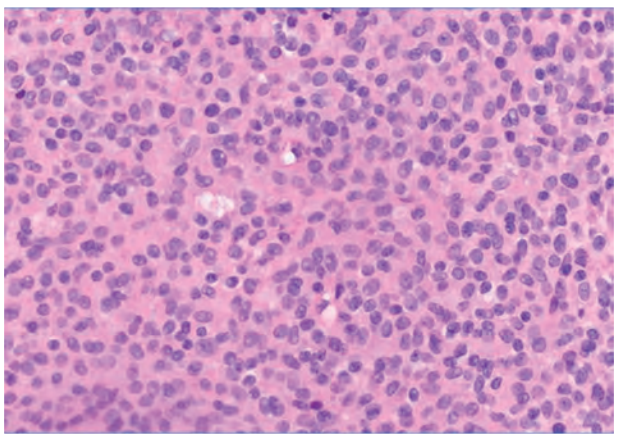








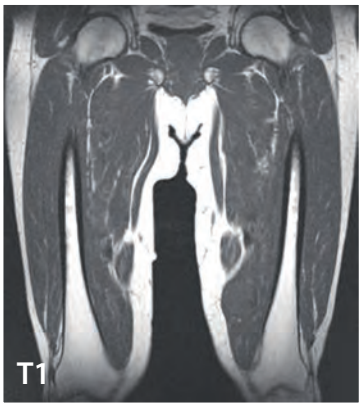


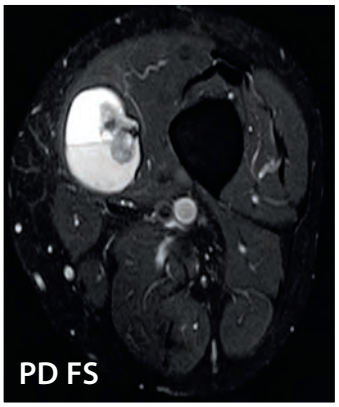


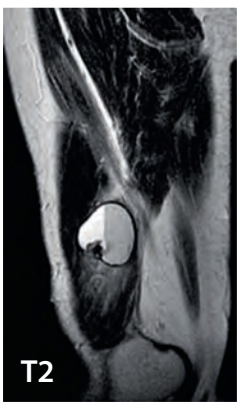
Case 27

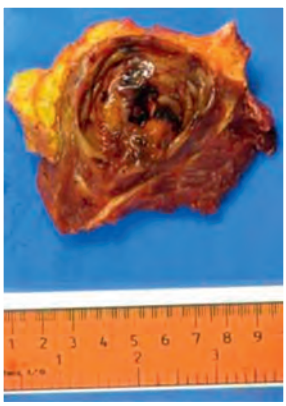
P. Odonnell, F. Amary, R. Tiraboasco, A. Flanagan
Royal National Orthopedica Hospital, Stanmore, United Kingdom

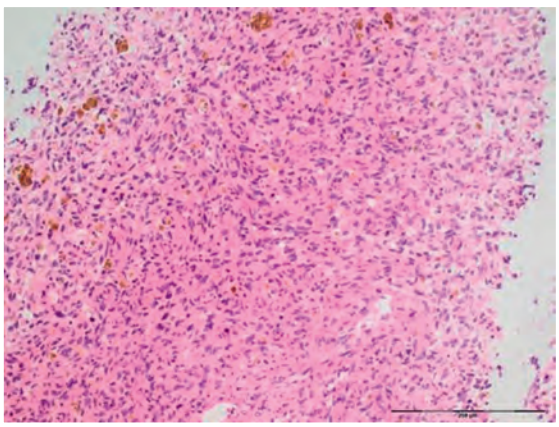
A 53 year old male presents with four weeks of painless swelling, radiating discomfor and recently, enlargement of the left medial thigh.

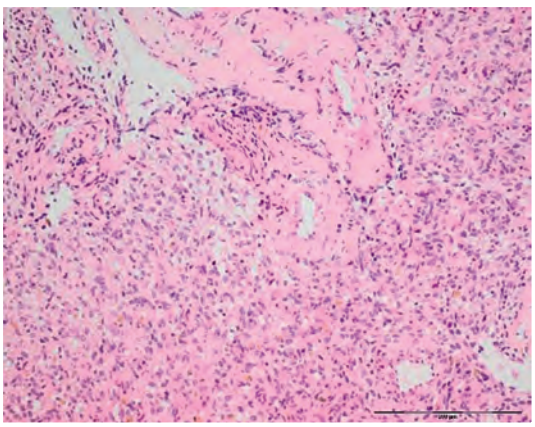








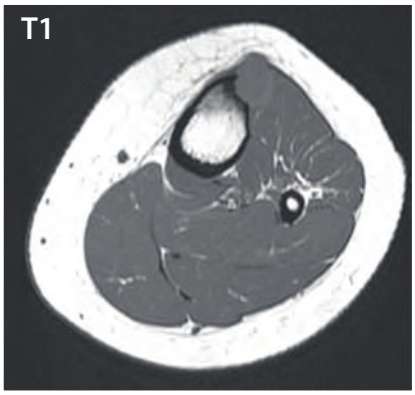


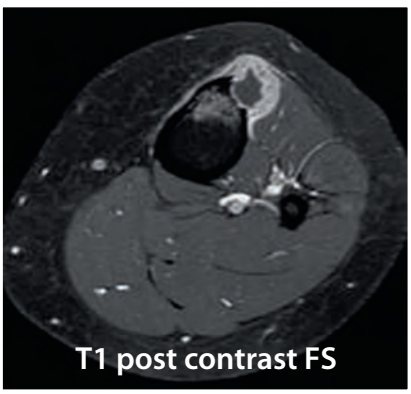


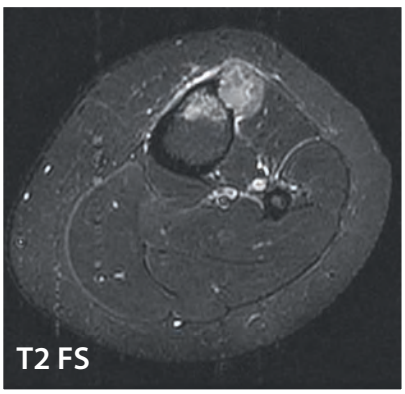
Case 28

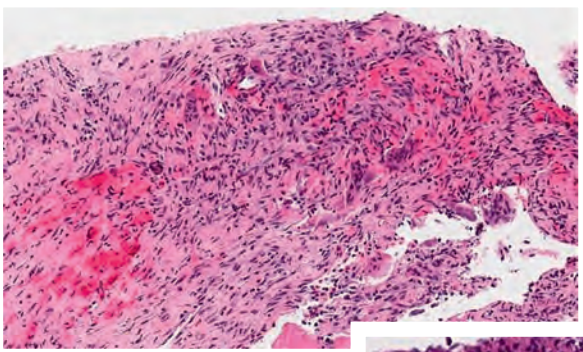
S. Aisner, M. Blacksin, C. Curcio, J. Nuttall, F. Patterson
Rutgers New Jersey Medical School, Newark, NJ, USA

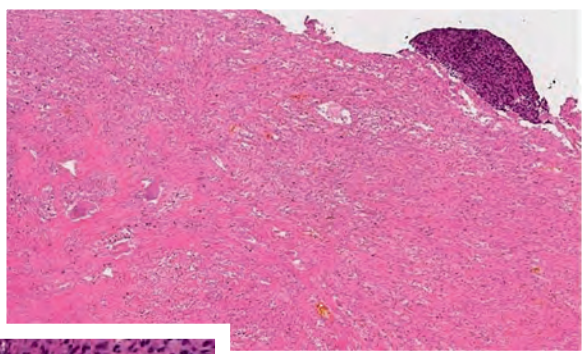
A 22 year old female presented for evaluation of a left lower leg mass with sharp pain radiating down the anterior left leg to the dorsum of the foot. There were no associated systemic signs, symptoms or relevant medical or family history

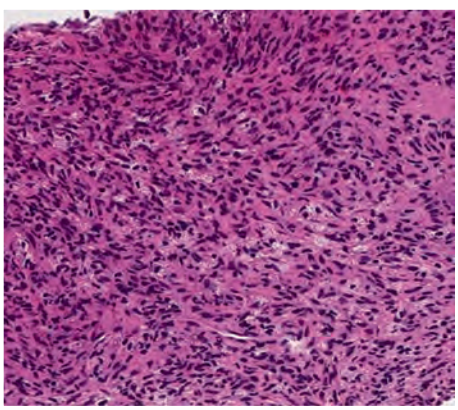








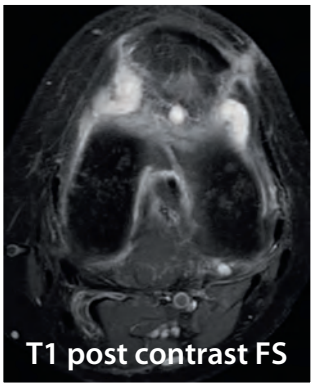


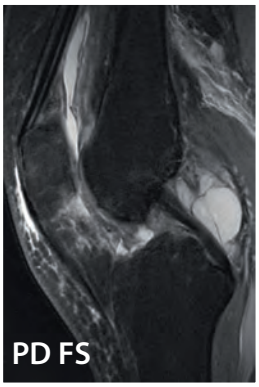


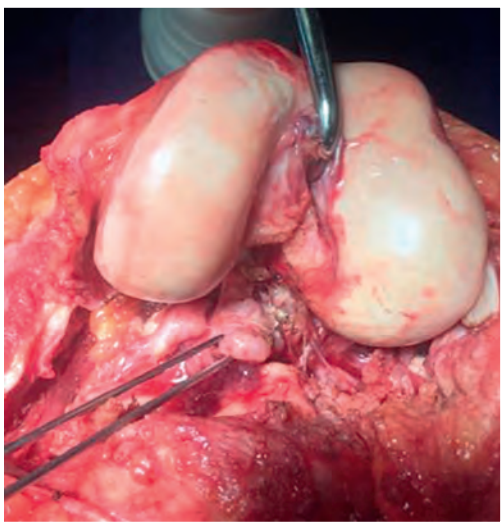
Case 29

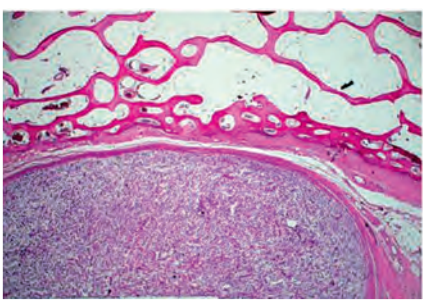
M. Bordalo-Rodrigues, C. Regina de Oliveira, C. Kurimori, A. Batista, O. Camargo
Universitiy of Sao Paulo Medical School and Hospital Sirio-Libanes, Sao Paulo, Brazil

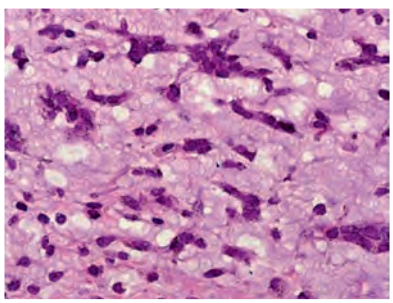
A 51 year old female presents with two months of left knee tenderness. No other history.

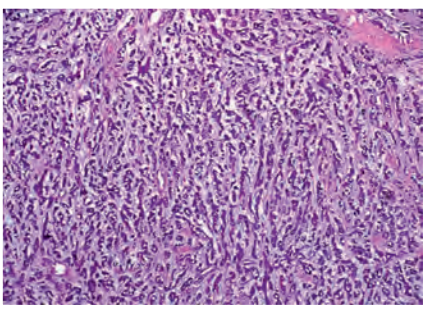


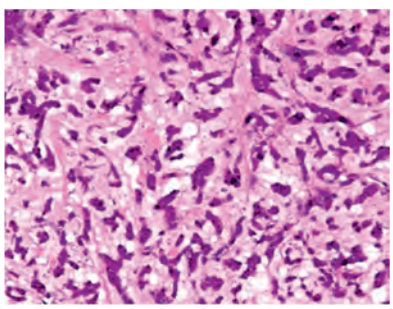








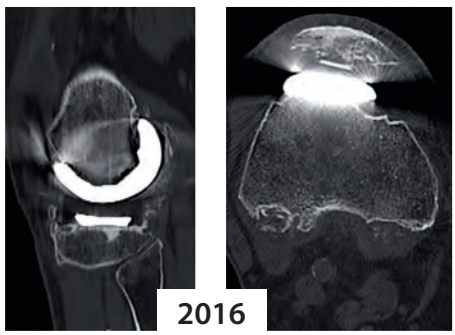


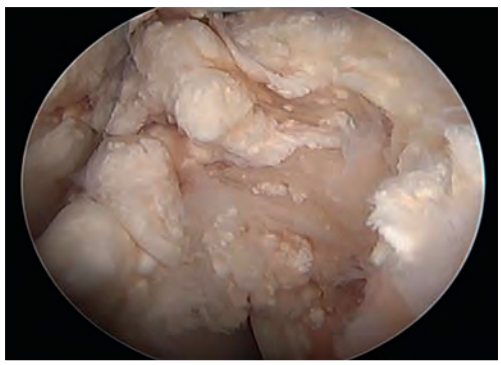


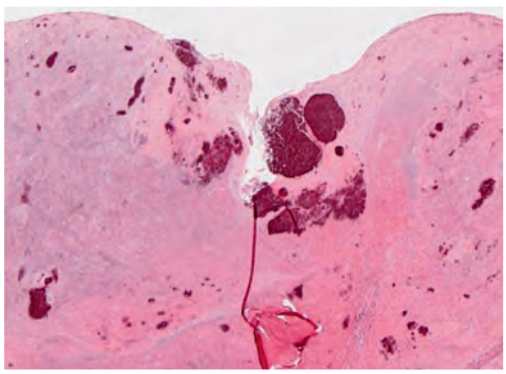
Case 30

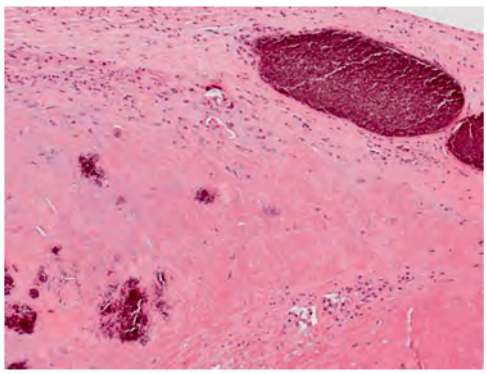
E. DiCarlo, R. Schneider, M. Bansal
Hospital for Special Surgery, New York, NY, USA

A 69 year old female presents with a right total knee replacement 8 years ago. Now with a 2 year history of right knee pain.





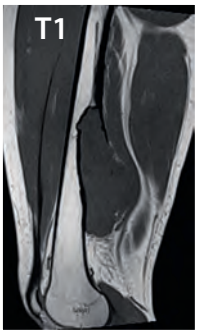


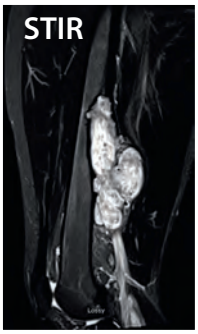


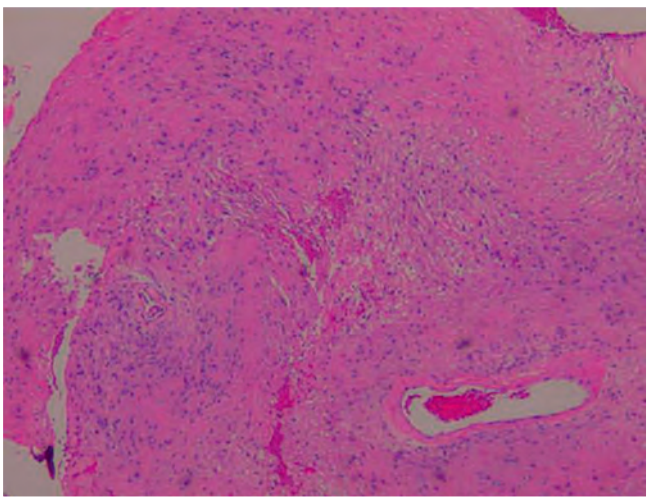
Case 31

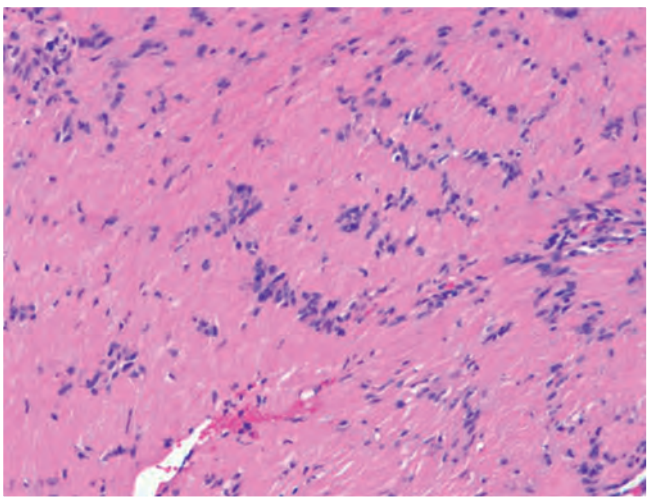
Z. Jibri, K. Rakhra, B. Purgina, J. Werier, M. Schweitzer
Ottawa Hospital, Ottawa, Onario, Canada and Stony Brook University, Stony Brook, NY, USA

A 19 year old female presents with a painless slowly growing right posterior thigh "lump" of 5 months duration, initially noticed by the massage therapist. No constitutional symptoms. Physical examination reveals a nontender palpable mass.





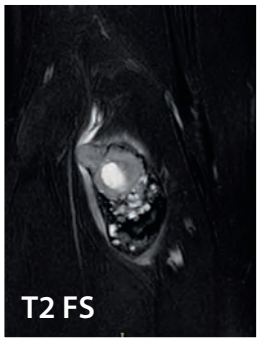


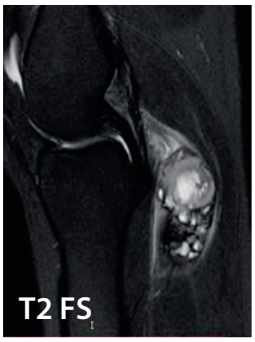


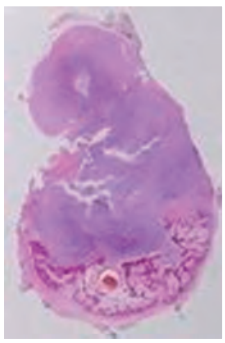
Case 32

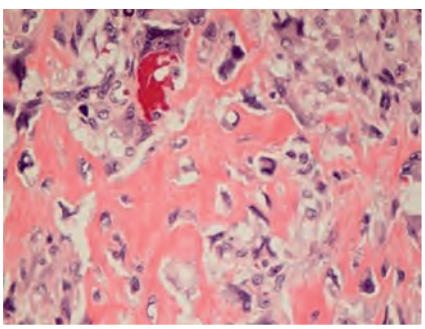
S. Kenan, L. Kahn, D. Walz, D. Savant, S. Kenan
Northwell Long Island Jewish, New Hyde Park, NY, USA

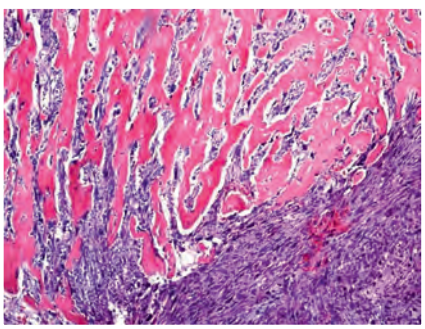
A 23 year old female presents with a nine month history of progressive swelling and mild pain over right popliteal fossa. No history of trauma.

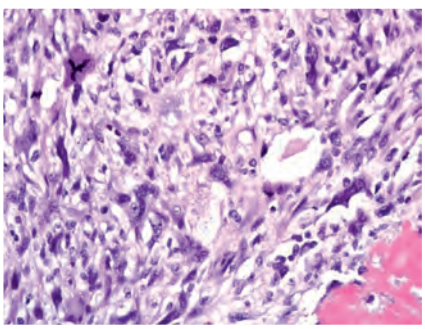


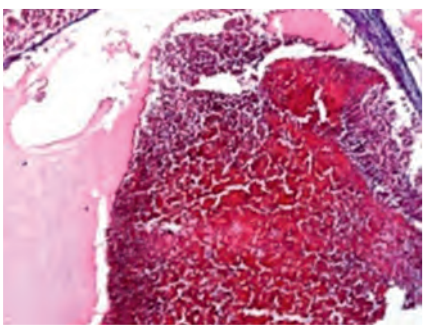


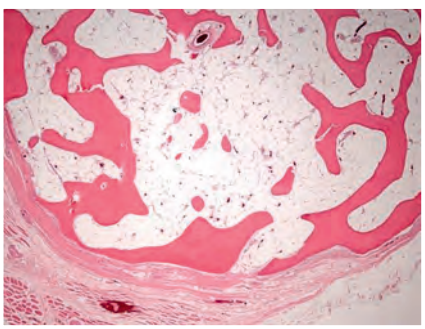


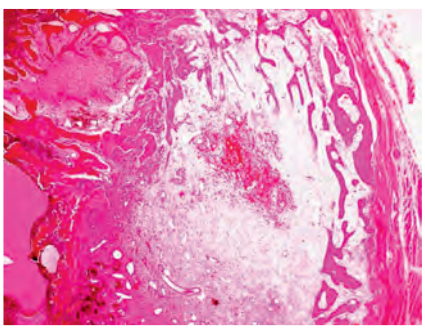








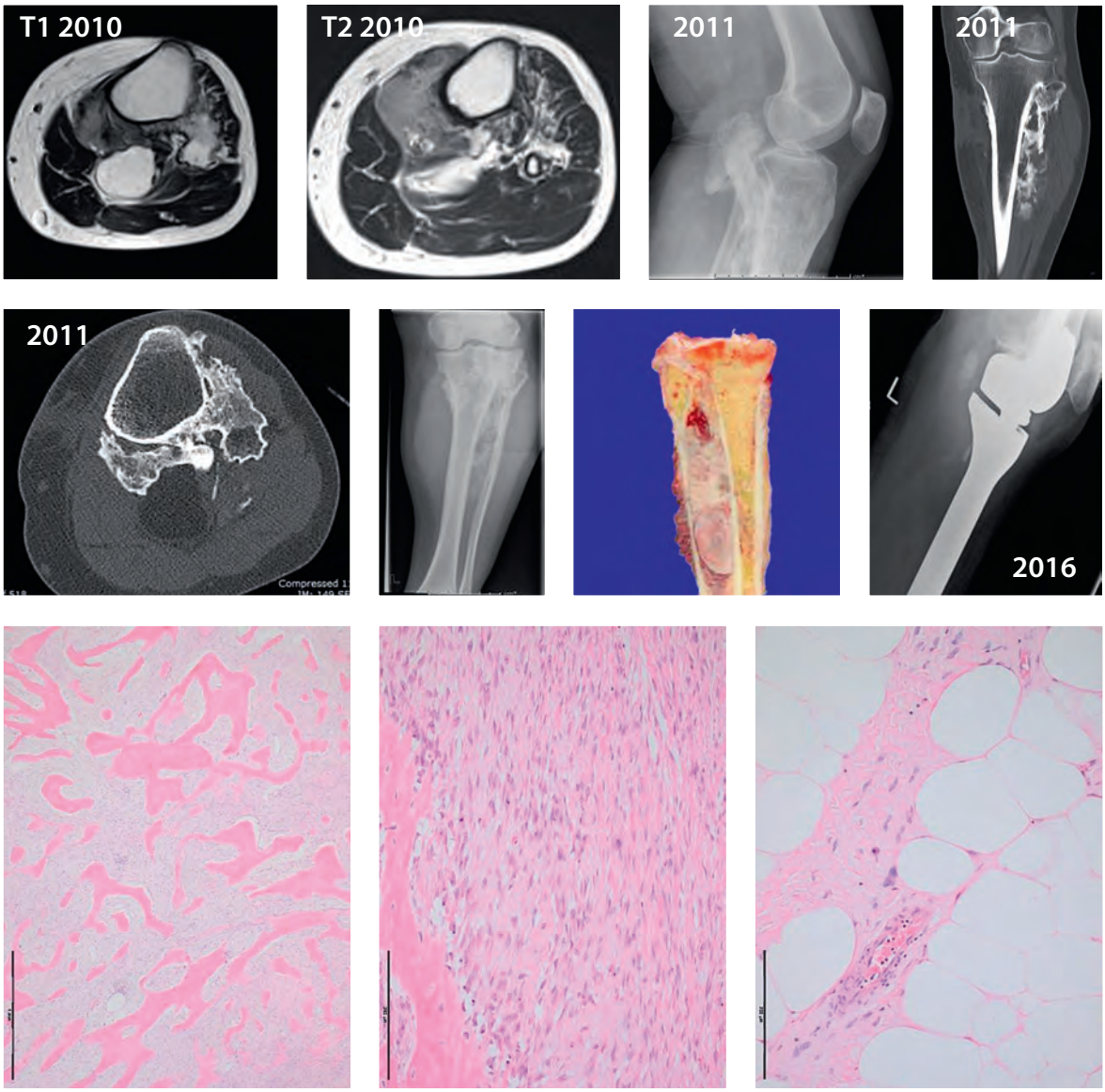




Case 33

R. Lalam, F. Amary, V. Pullicino, P. Tyrrell, P. Cool, D. C. Mangham
Robert Jones and Agnes Hunt Orthopaedic Hospital, Oswestry, United Kingdom

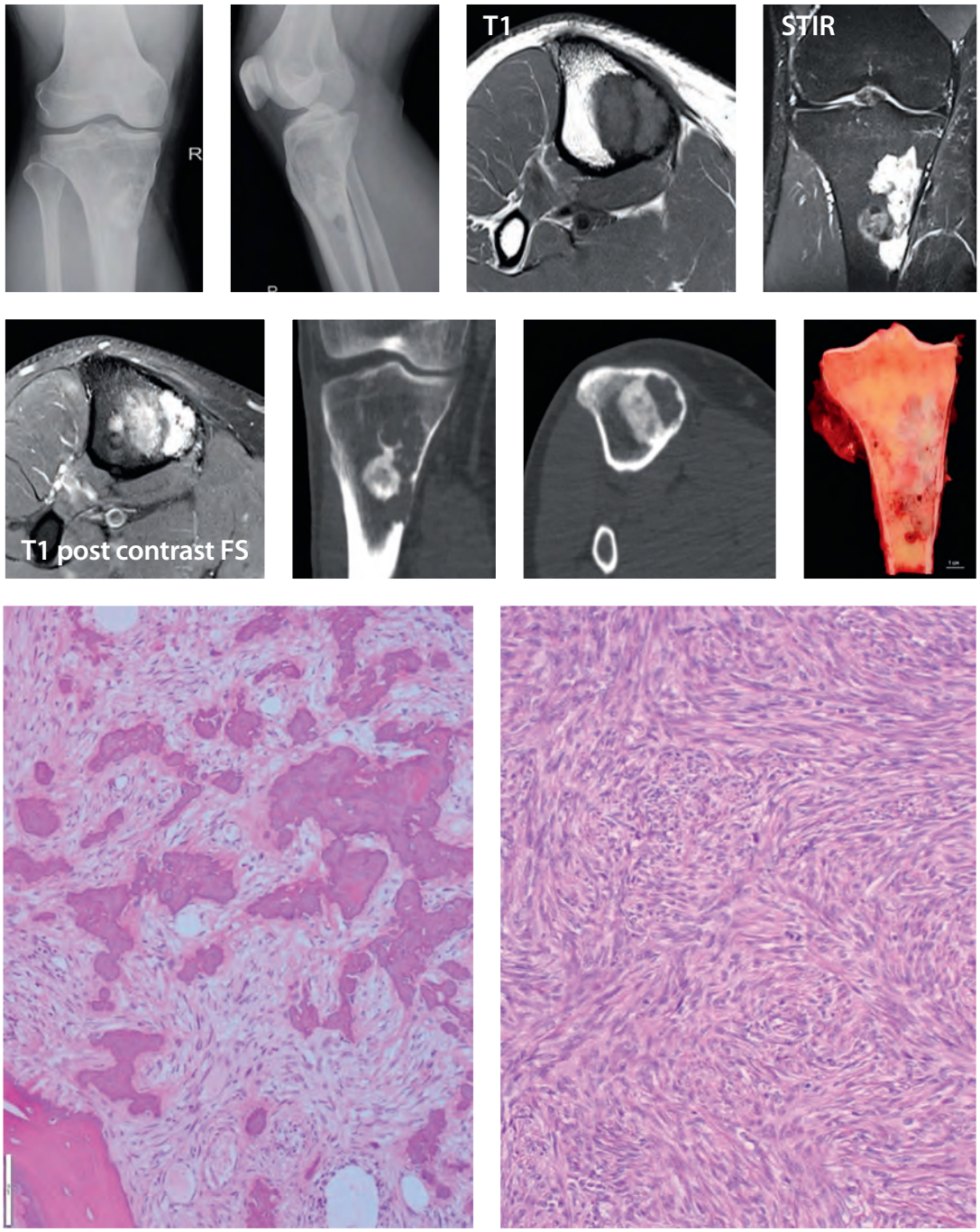
A 39 year old female presents with pain in the left lower leg. Four years earlier, she fell down the stairs while carrying her newborn baby. She was unable to weight bear immediately after the injury but did not seek medical help. Over the ensuing several years, she noticed a gradually lump in the leg.



Case 34

R. Sutter, B. Bode, D. Mueller, C. Pfirrmann
Balgrist University Hospital, Zurich, Switzerland

A 41 year old male presents with 5-month history of increasing pain in the proximal right tibia after ankle sprain. No night pain. Dependent on crutches. Otherwise healthy.



Members' Meeting

Day 4

AUGUST 2017						
Sat 26	Sun 27	Mon 28	Tue 29	Wed 30	Thu 31	Fri 1

10:30 – 12:00

Session VI:

Moderators: Yong Koo Park, Mark Murphey

Case Presentations

10:30 **Case 35:** C. Morris, L. Fayad, E. McCarthy
(Johns Hopkins Hospital, Baltimore, MD, USA)

10:45 **Case 36:** J. Carter, D. Wenger, C. Inwards
(Mayo Clinic, Rochester, MN, USA)

11:00 **Case 37:** S. Broski, J. Carter, C. Inwards, D. Wenger
(Mayo Clinic, Rochester, MN, USA)

11:15 **Case 38:** A. Cheah, J. Schatz, M. Fadia, D. Croaker, F. Bonar
(Douglass Hanly Moir, Macquarie Park; Royal Prince Alfred Hospital, Camperdown; Canberra Hospital, Garran, Australia)

11:30 **Case 39:** I. Kletskaya, D.V. Rogozhin, A.P. Ektova, D. Vanel, P. Picci
(Russian Children's Clinical Hospital, Moscow, Russia and Rizzoli Institute, Bologna, Italy)

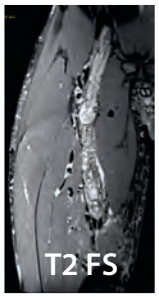
11:45 **Case 40:** H. Yamamoto, R. Yokoyama, I. Choi, Y. Oda
(Kyushu University, National Hospital Organization, Fukuoka, Japan)

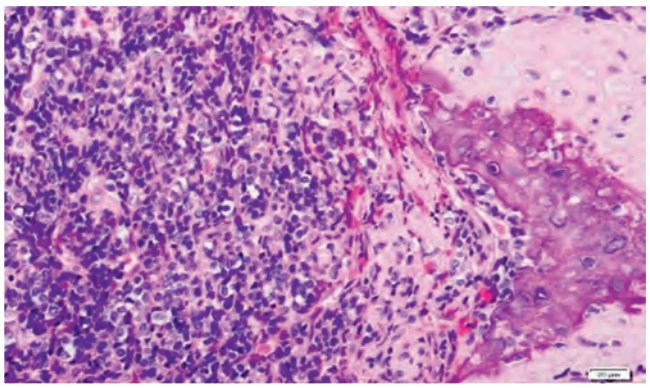
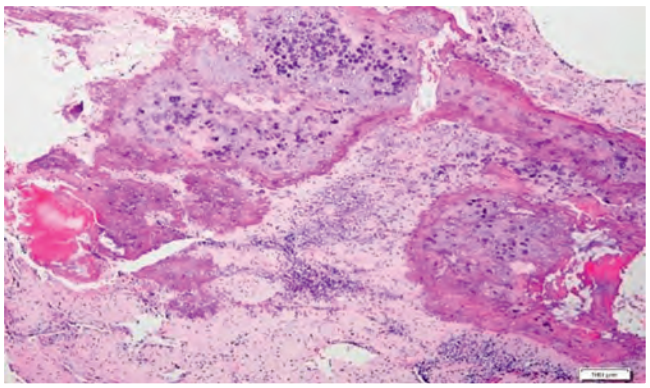
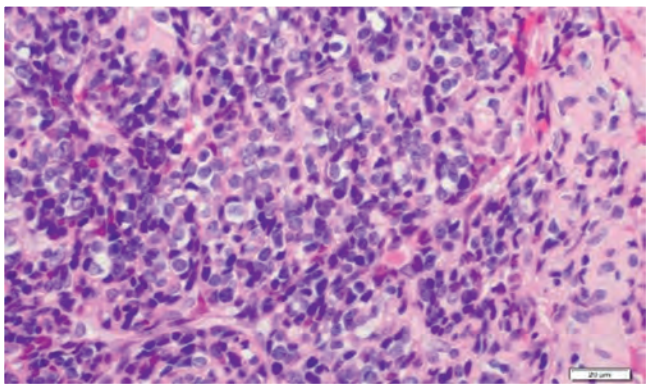
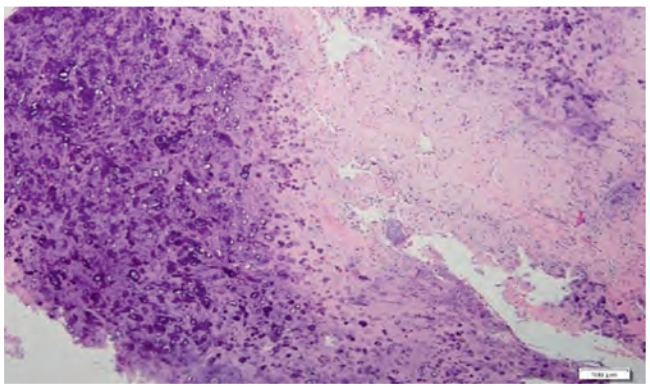
Case 35

C. Morris, L. Fayad, E. McCarthy
Johns Hopkins Hospital, Baltimore, MD, USA

A 30 year old male presents with thigh swelling. Ultrasound revealed a DVT, and he was started on anticoagulation for 1 year. Another year later, he presented with hemoptysis and multiple pulmonary emboli on Chest CT.



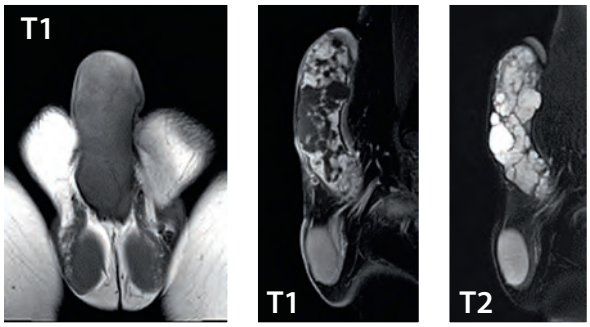



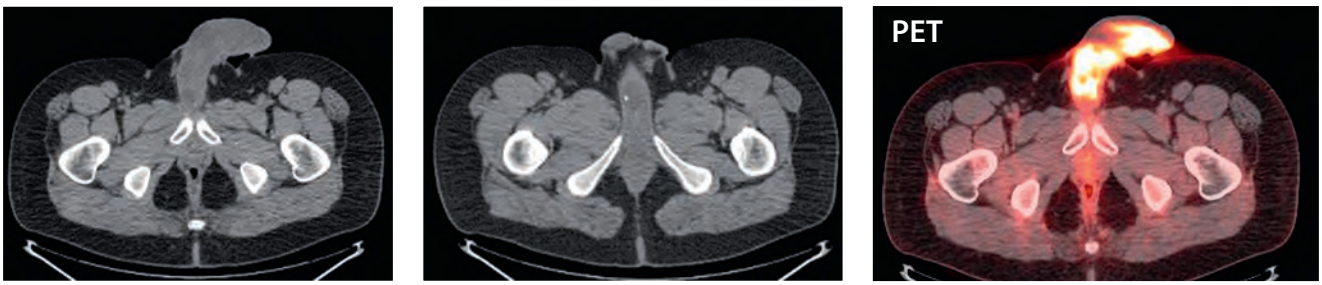
Case 36

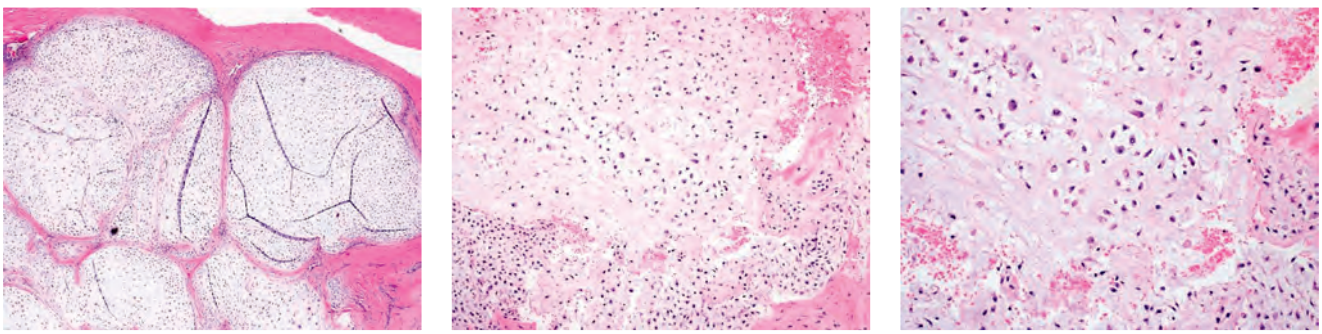
J. Carter, D. Wenger, C. Inwards,
Mayo Clinic, Rochester, MN, USA

A 33 year old male presents with a 1-year history of an enlarging, painless penile mass without lower urinary tract obstruction, erectile dysfunction or hematuria.



contrast

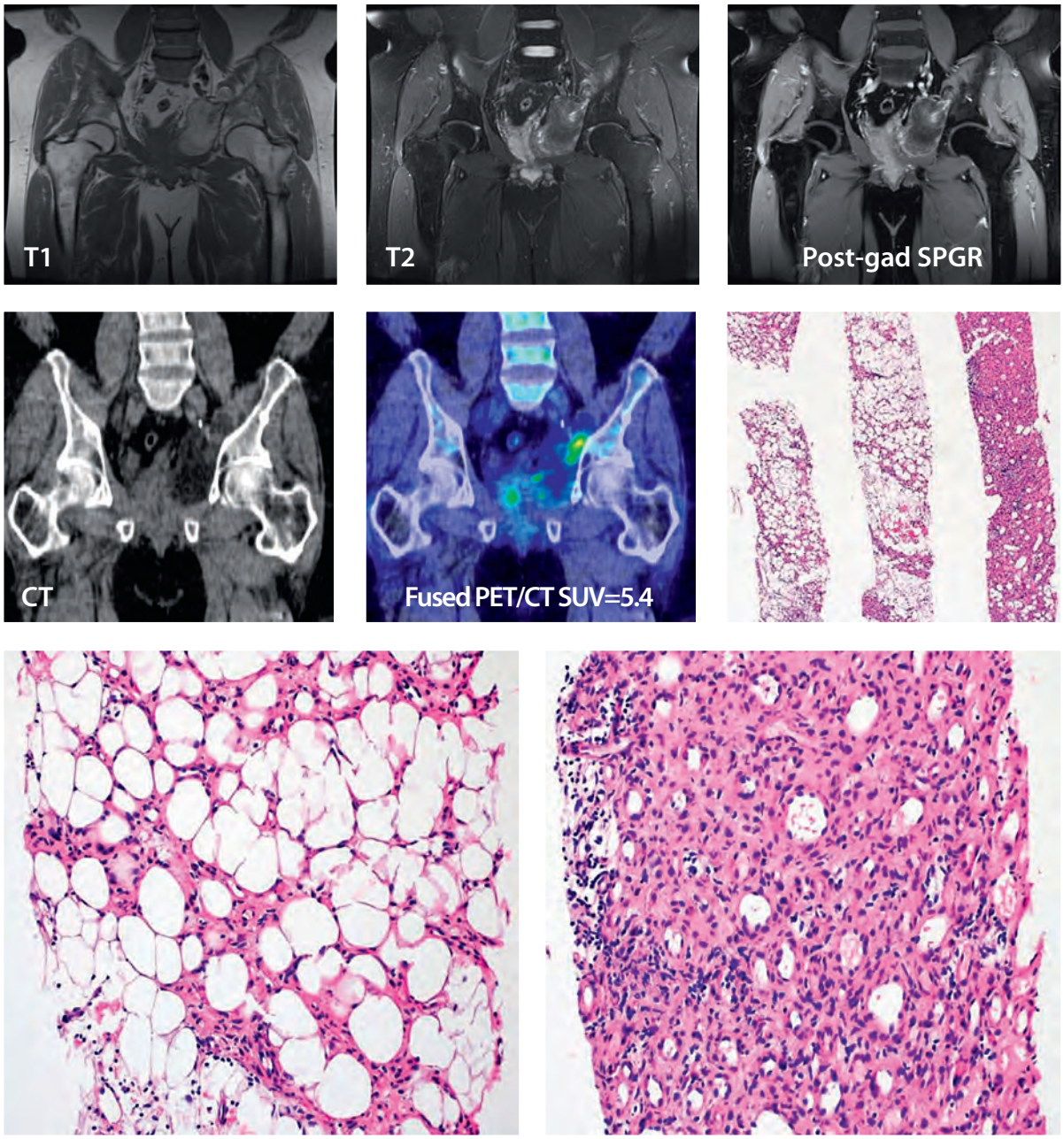




Case 37

S. Broski, J. Carter, C. Inwards, D. Wenger
Mayo Clinic, Rochester, MN, USA

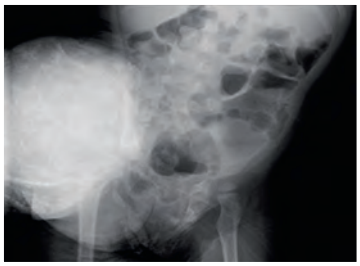
A 58 year old male presents with multiple atraumatic fractures over the past 10 years and recent increasing left groin pain.

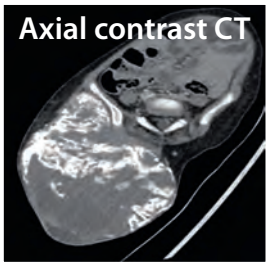


Case 38

A. Cheah, J. Schatz, M. Fadia, D. Croaker, F. Bonar
Douglass Hanly Moir, Macquarie Park; Royal Prince Alfred Hospital, Camperdown; Canberra Hospital, Garran, Australia

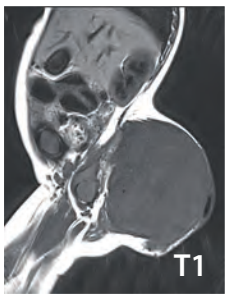
A 2 year old male presents with a large mass in the hip region present since birth.



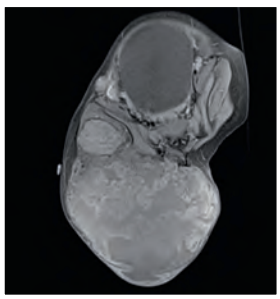


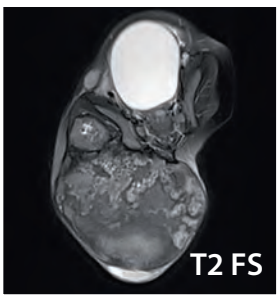
CT coronal reformation

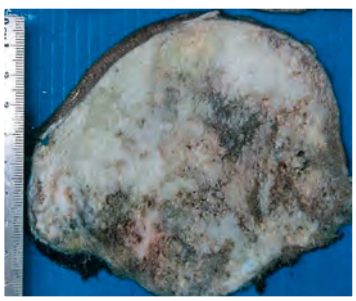
CT 3D reformation

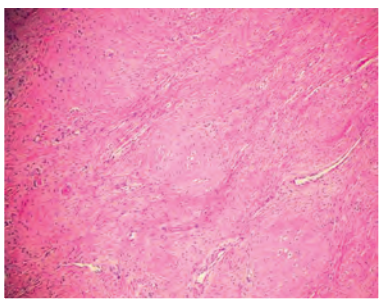


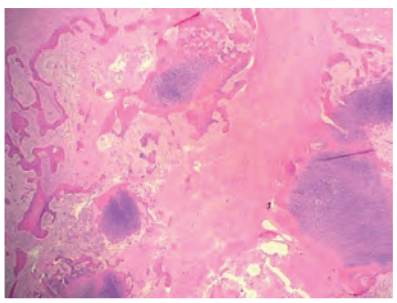
T1 post contrast FS

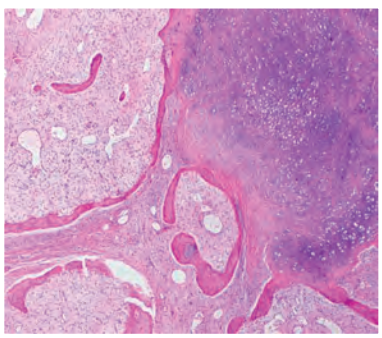


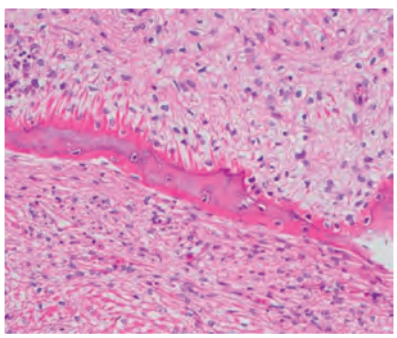








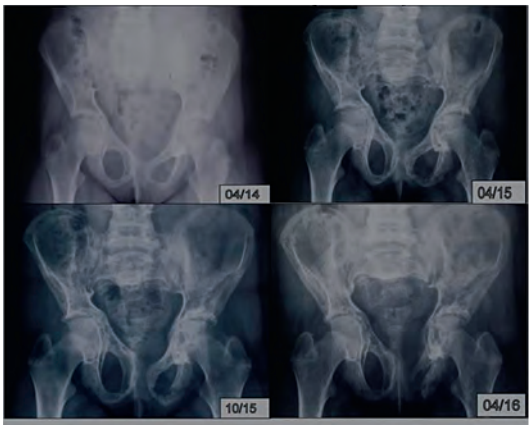


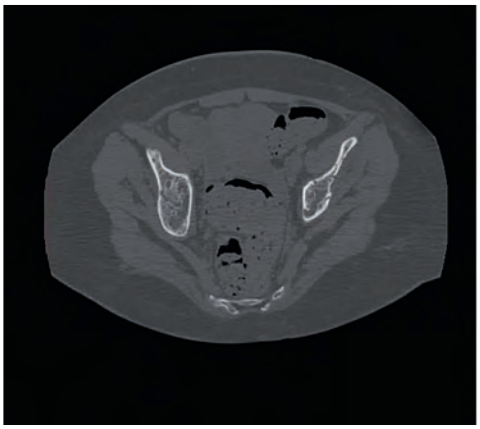


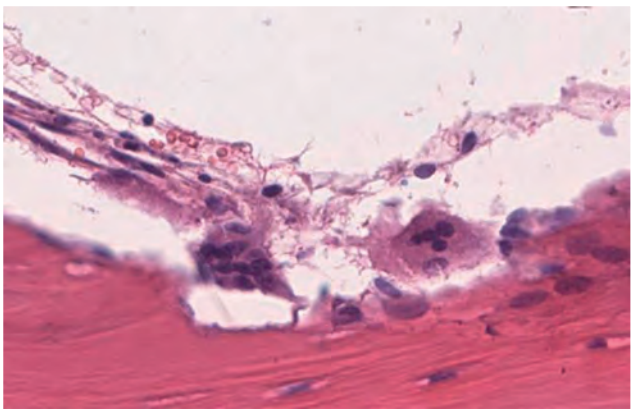
Case 39

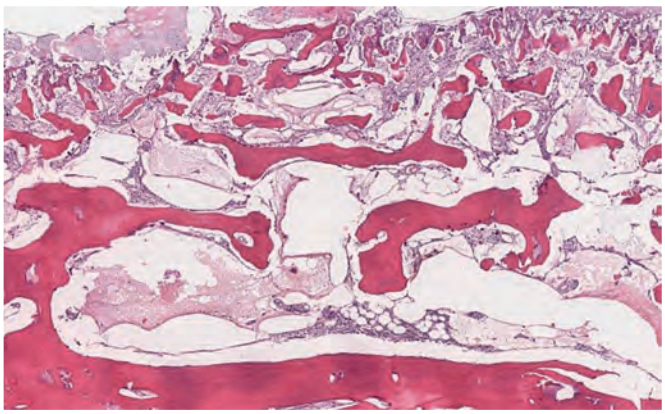
I. Kletskaya, D.V. Rogozhin, A.P. Ektova, D. Vanel, P. Picci
Russian Children's Clinical Hospital, Moscow, Russia and Rizzoli Institute, Bologna, Italy

A 12 year old female with a 3 year history of right leg pain after minor trauma; X-ray and CT examination revealed multiple lytic lesions in pelvic bones (ilium, sacrum) and vertebrae (L4); ultrasound examination revealed a spleen cyst.





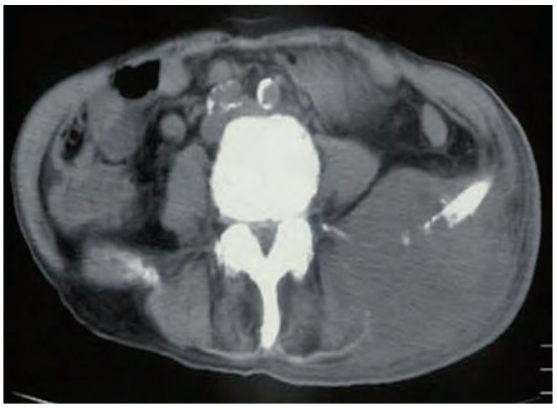


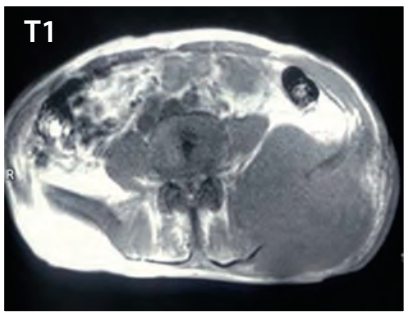


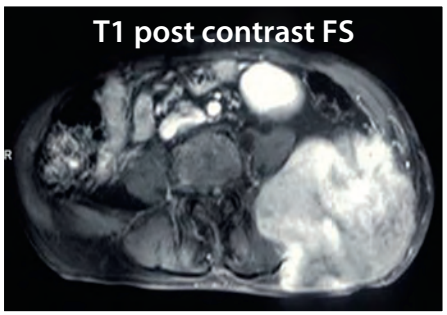
Case 40

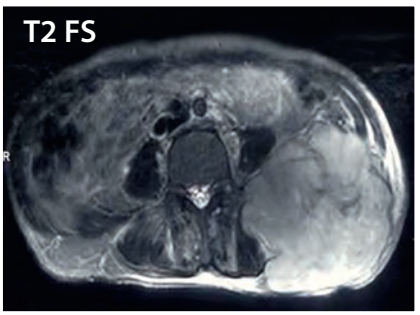
H. Yamamoto, R. Yokoyama, I. Choi, Y. Oda
Kyushu University, National Hospital Organization, Fukuoka, Japan

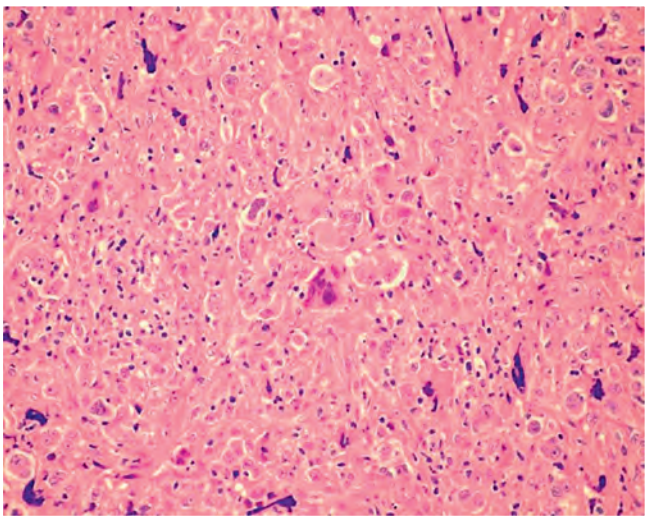
A 76 year old male presents with an 8-year history of Polycythemia Vera. Recently, he noticed a mass and pain in his left lower back.

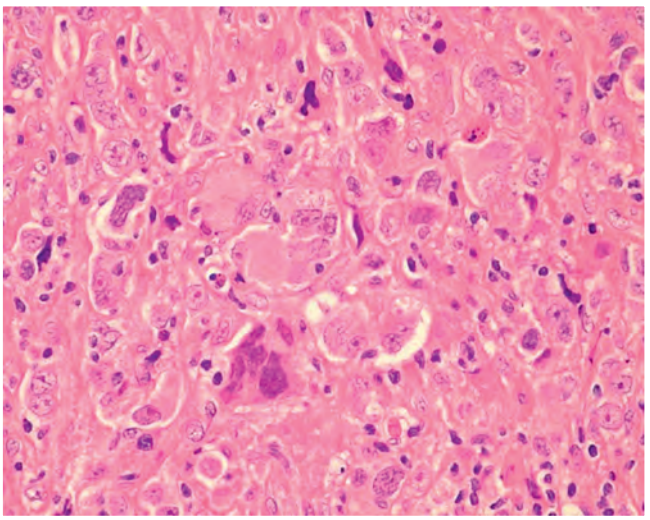












Members' Meeting

Day 4

AUGUST 2017						
Sat 26	Sun 27	Mon 28	Tue 29	Wed 30	Thu 31	Fri 1

01:15 – 03:15

Session VII:

Moderators: Andrew Rosenberg, Gina Allen

Case Presentations

01:15 **Case 41:** F. Bertoni, P. Bacchini, P. Davidovitz
(University of Bologna and Gruppo San Donato Villa Erbosa Hospital, Villa Hesperia Hospital, Moderna and Bologna, Italy)

01:30 **Case 42:** F. Bertoni, P. Bacchini, C. Marchetti, F. Bolognesi, G. Savastio
(University of Bologna and Gruppo San Donato Villa Erbosa Hospital, Bologna, Italy)

01:45 **Case 43:** J. Carter, C. Inwards, B. Howe
(Mayo Clinic, Rochester, MN, USA)

02:00 **Case 44:** F. Amary, R. Tirabosco, P. O'Donnell, A. Flanagan
(Royal National Orthopedic Hospital, Stanmore, United Kingdom)

02:15 **Case 45:** D.V. Rogozhin, S.N. Moiseev, A.S. Kozlov, I.S. Kletskaya, A.P. Ektova
(Russian Children's Hospital, Moscow, Russian Federation)

02:30 **Case 46:** P. Dei Tos, M. Gambarotti, M. Sbaraglia, D. Donati, D. Vanel
(Rizzoli Institute, Bologna, Italy)

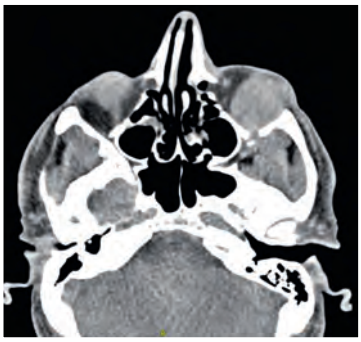
02:45 **Case 47:** Y. Oda, Y. Yamada, H. Yamamoto, Y. Matsumoto
(Kyushu University, Fukuoka, Japan)

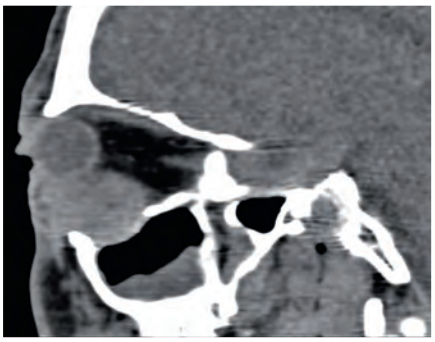
03:00 **Case 48:** S.E. Kilpatrick, M. Sundaram
(Cleveland Clinic, Cleveland, OH, USA)

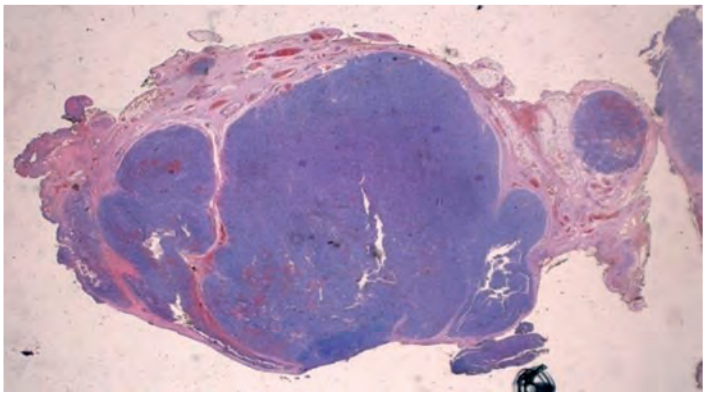
Case 41

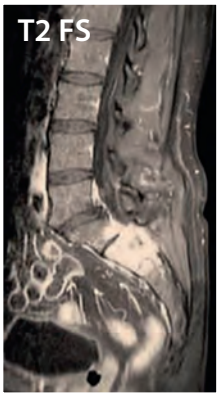
F. Bertoni, P. Bacchini, P. Davidovitz
University of Bologna and Gruppo San Donato Villa Erbosa Hospital,
Villa Hesperia Hospital, Moderna and Bologna, Italy

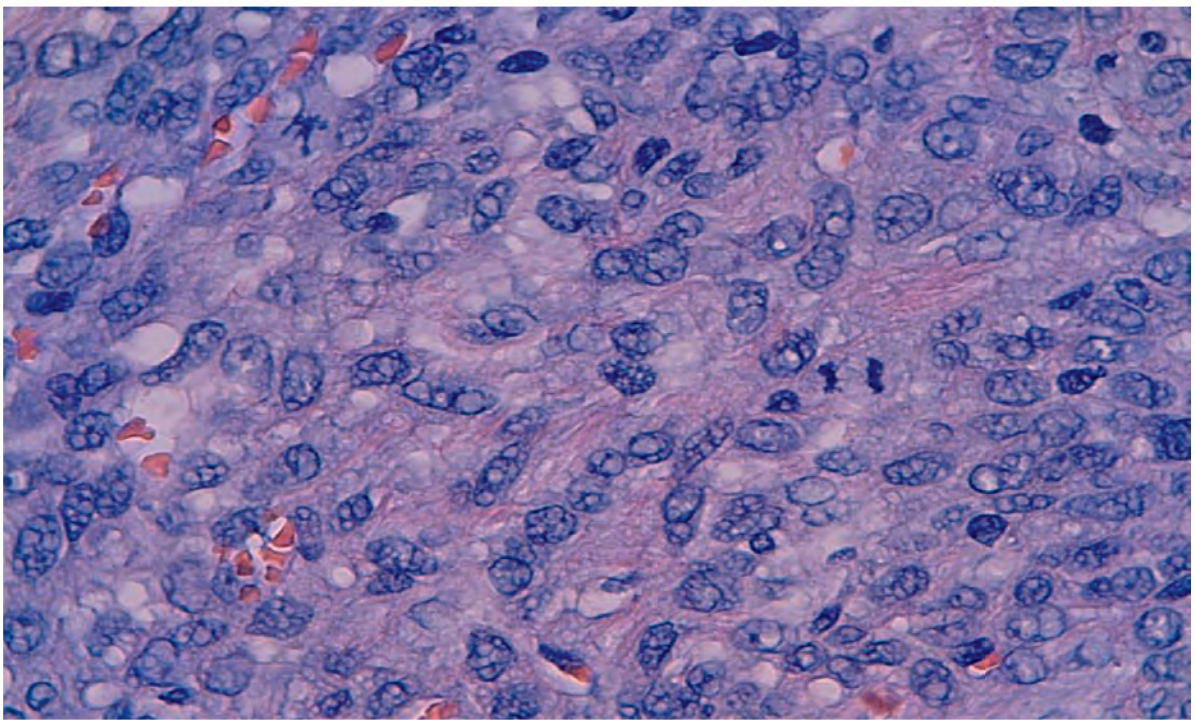
A 43 year old male presents with four months of pain and swelling in the left orbital region, with visual impairement.







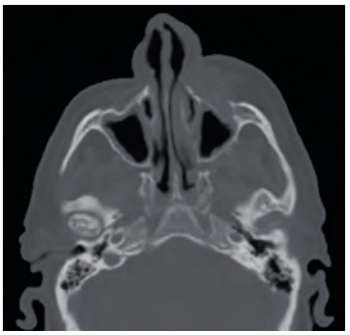


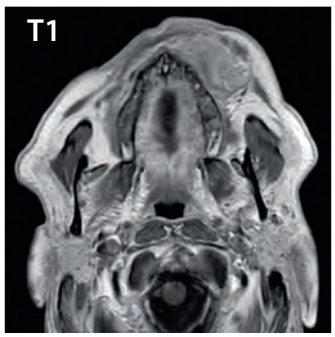


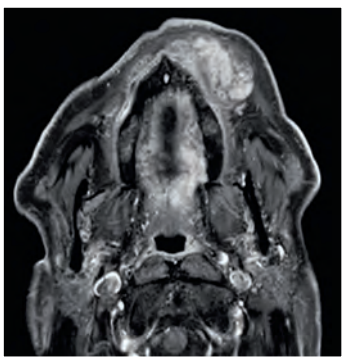
Case 42

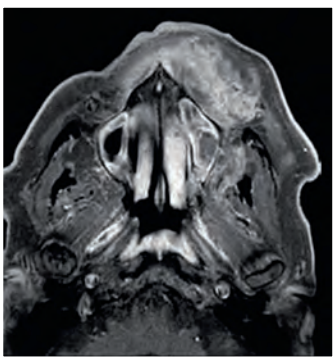
F. Bertoni, P. Bacchini, C. Marchetti, F. Bolognesi, G. Savastio
University of Bologna and Gruppo San Donato Villa Erbosa Hospital, Bologna, Italy

A 79 year old male presents with a long history of painless facial swelling without motor, senory or visual impairment.



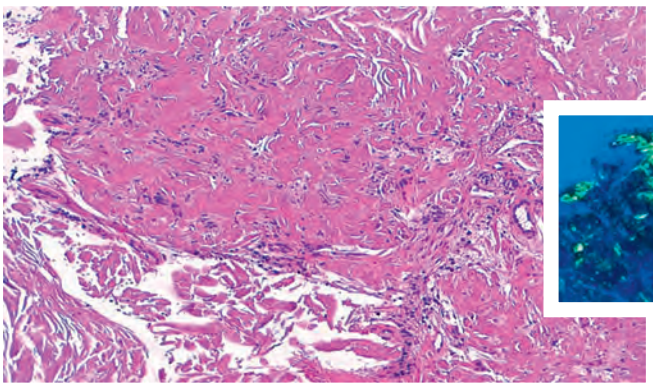


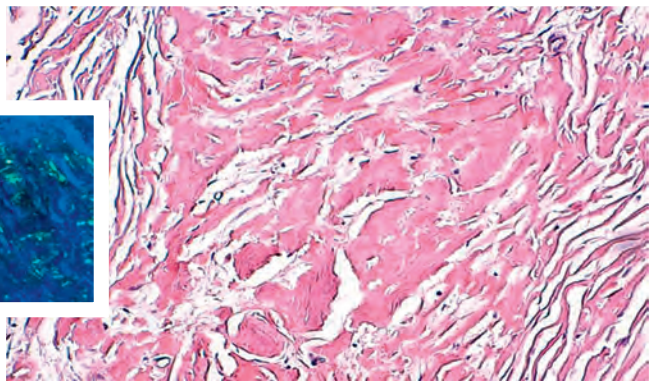




T1 post contrast FS

T1 post contrast FS
1 year later

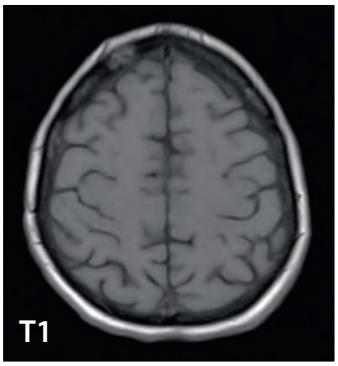


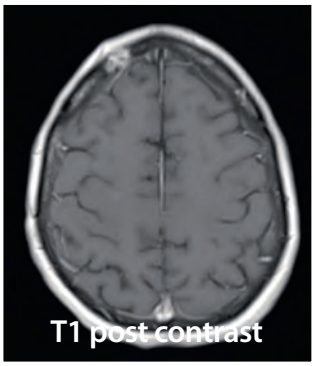


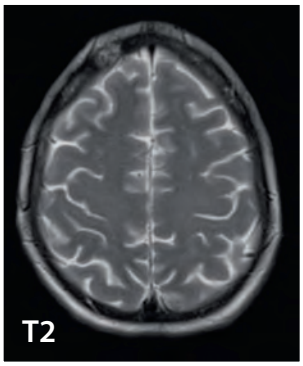
Case 43

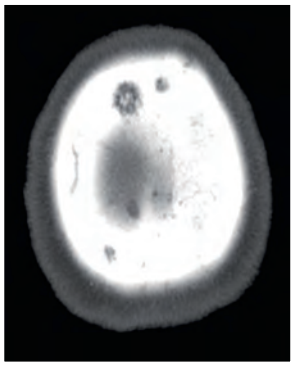
J. Carter, C. Inwards, B. Howe
Mayo Clinic, Rochester, MN, USA

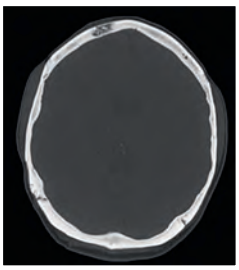
A 50 year old female presents with 3-months of episodic headaches, with pain that starts at her forehead and extends down to her ear, across the temporal area.

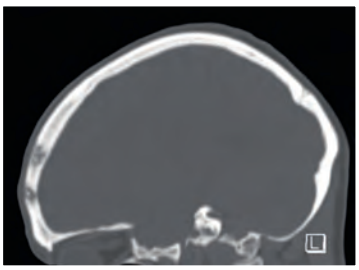


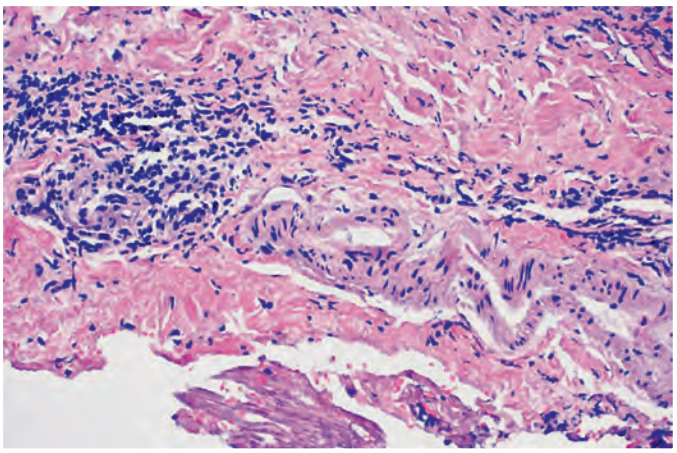


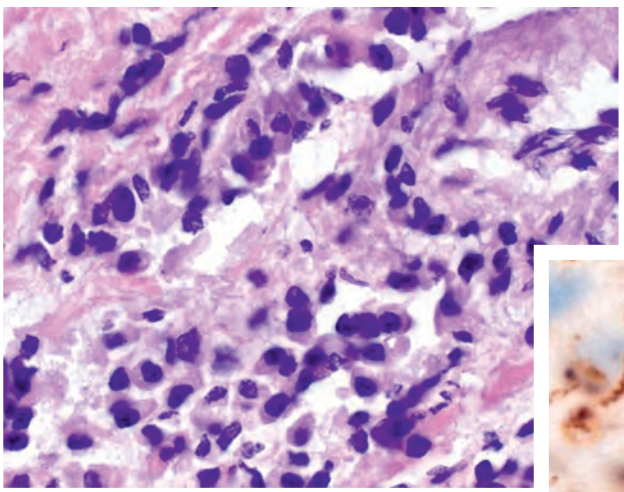


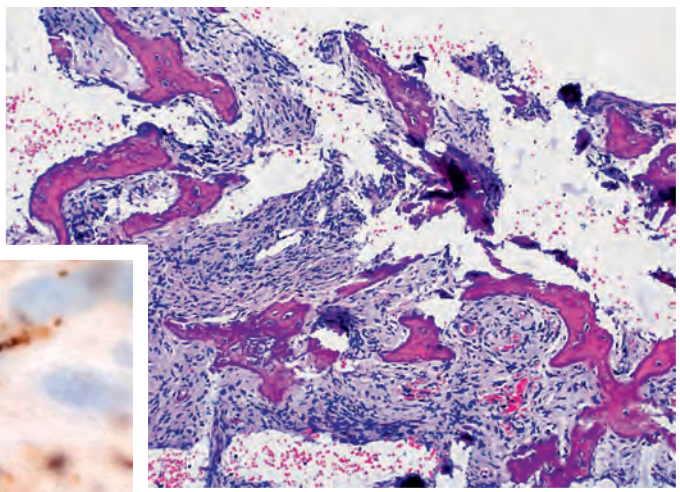








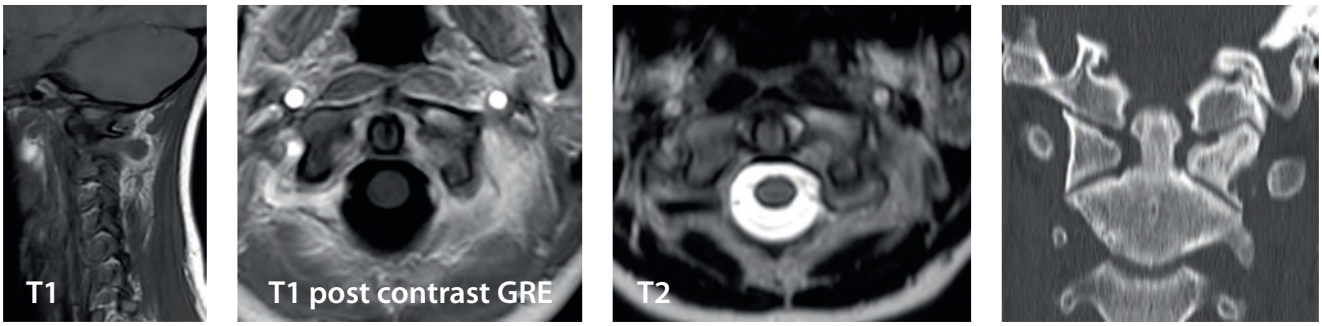


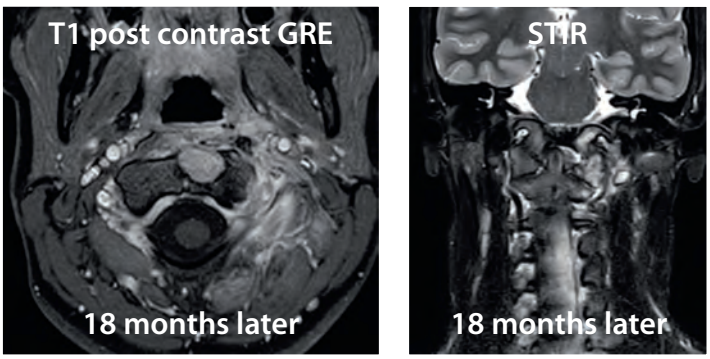


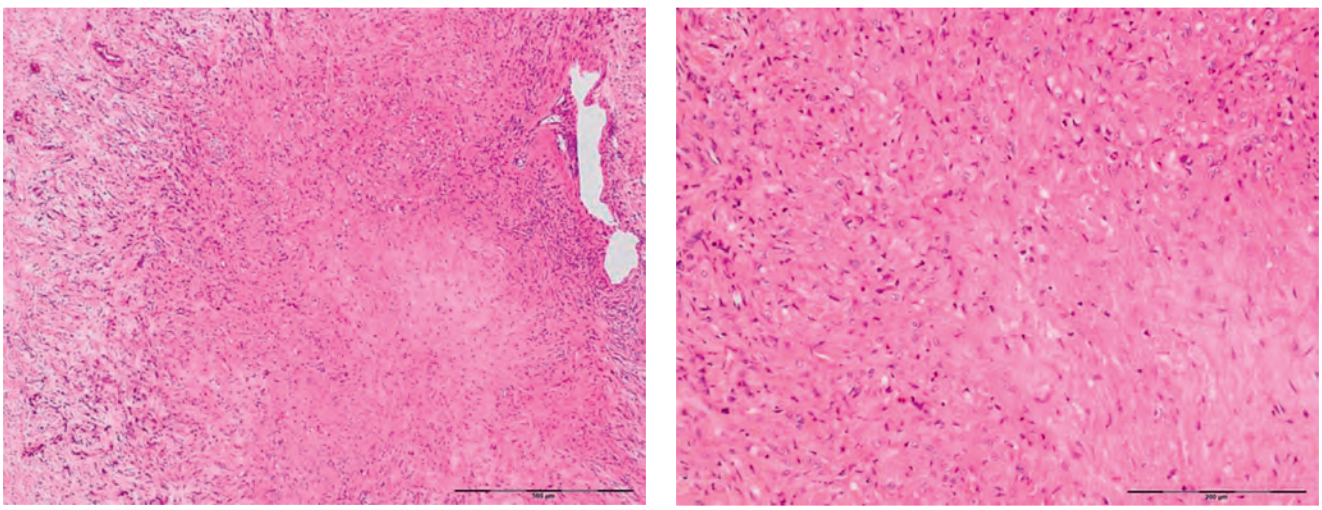
Case 44

F. Amary, R. Tirabosco, P. O'Donnell, A. Flanagan
Royal National Orthopedic Hospital, Stanmore, United Kingdom

A 15 year old female presents with neck pain for more than 1 year.



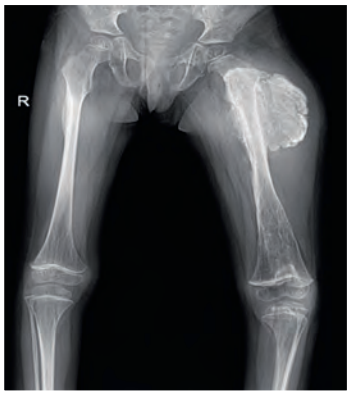


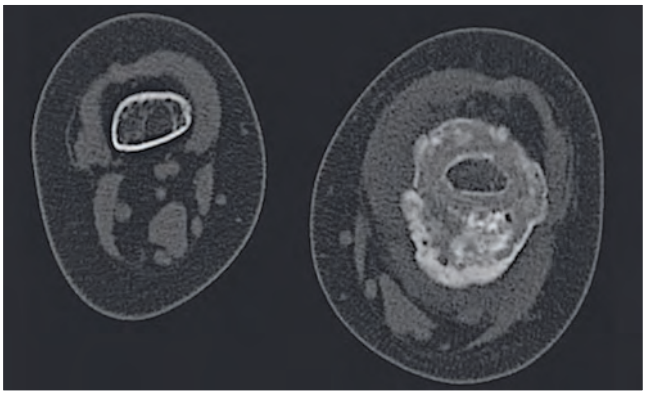


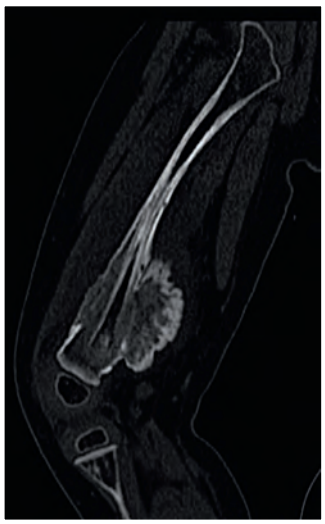
Case 45

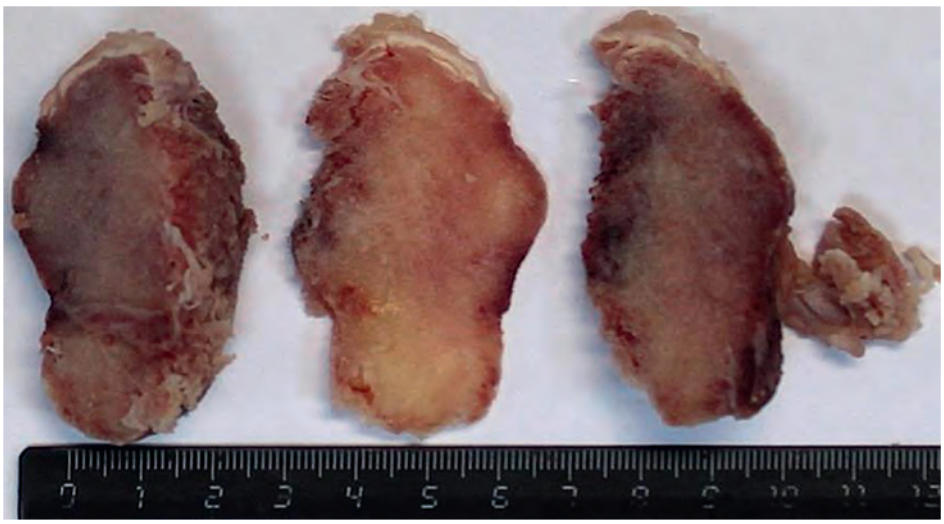
D.V. Rogozhin, S.N. Moiseev, A.S. Kozlov, I.S. Kletskaya, A.P. Ektova
Russian Children's Hospital, Moscow, Russian Federation

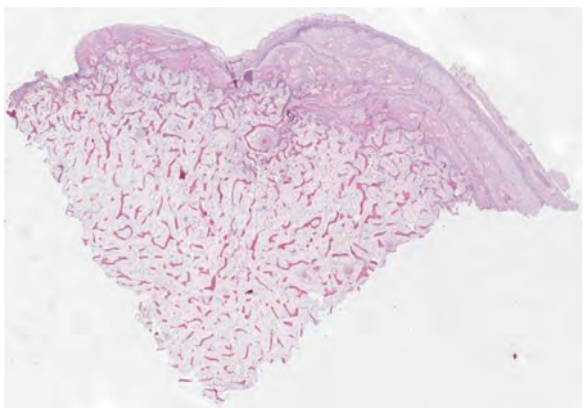
A 3 year old female presents with a traumatic incident one and a half years ago , with slight pain in the left proximal femur and inability to ambulate.

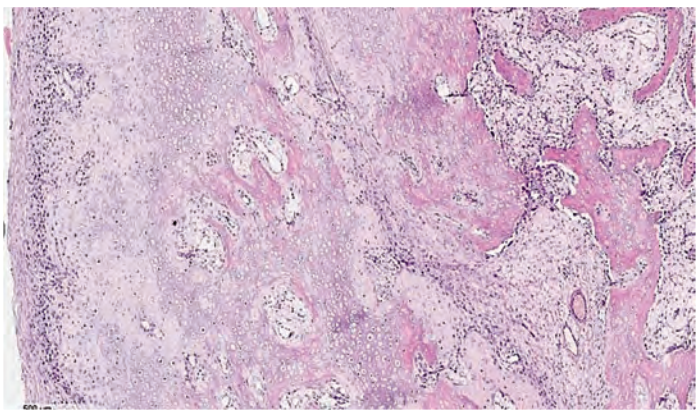








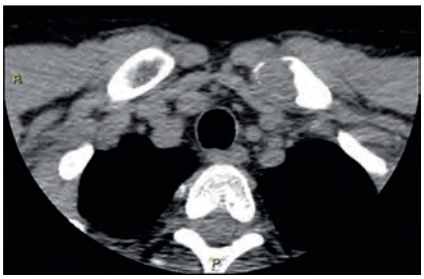


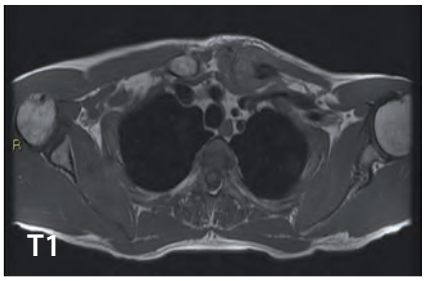


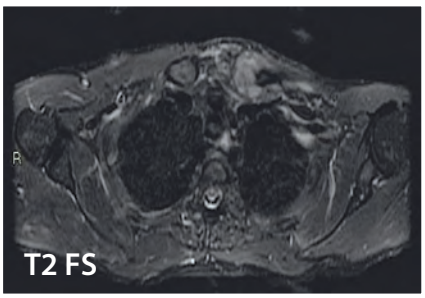
Case 46

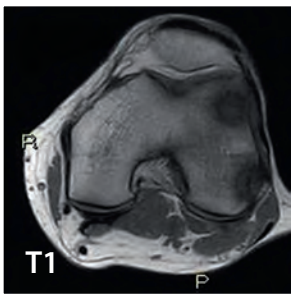
P. Dei Tos, M. Gambarotti, M. Sbaraglia, D. Donati, D. Vanel
Rizzoli Institute, Bologna, Italy

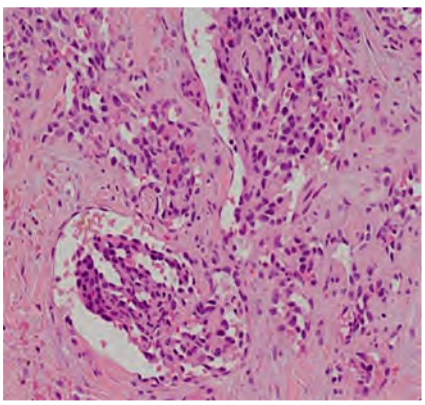
A 51 year old male presents with a painful clavicle for two months.

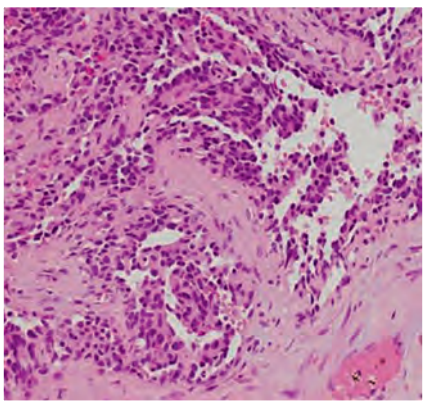


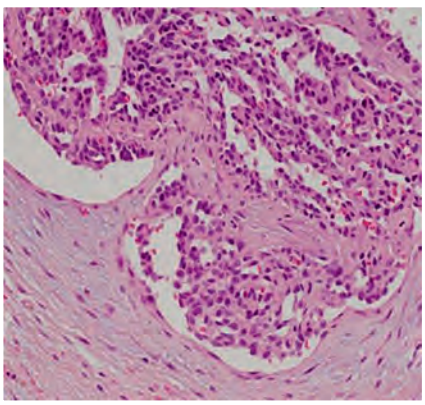








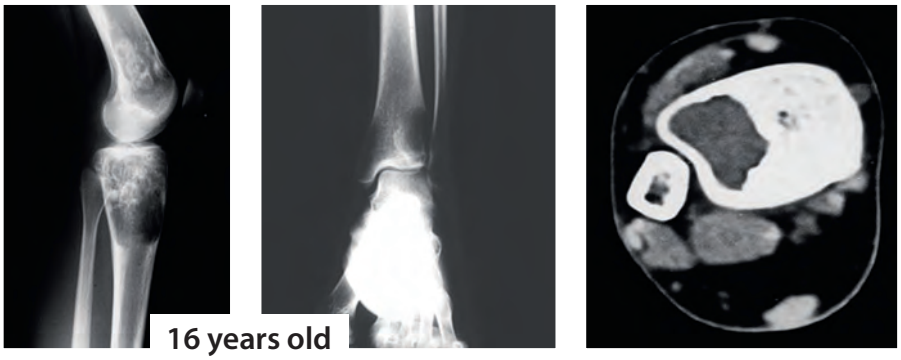


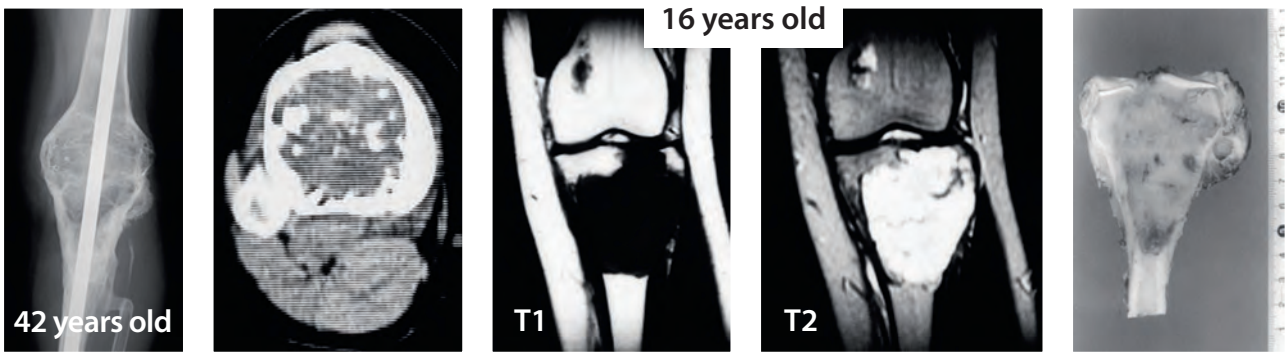


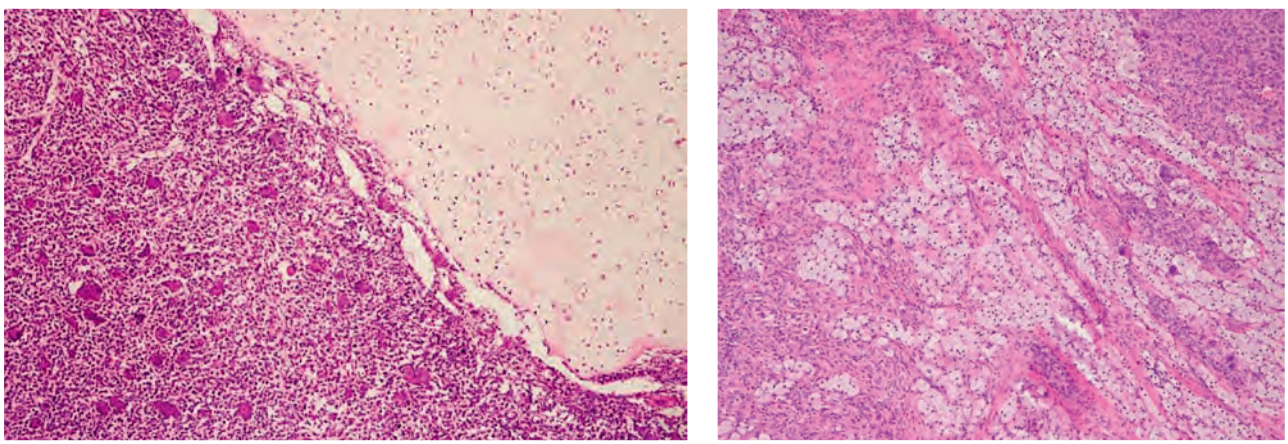
Case 47

Y. Oda, Y. Yamada, H. Yamamoto, Y. Matsumoto
Kyushu University, Fukuoka, Japan

A 42 year old female presents with a 3-months history of left knee pain when she was 16 years old (26 years ago); osteolytic lesions were identified. By age 32 years she had a left acetabulum lesion, and then ten years later (now, age 42 years) she has a recurrence or metachronous lesion.



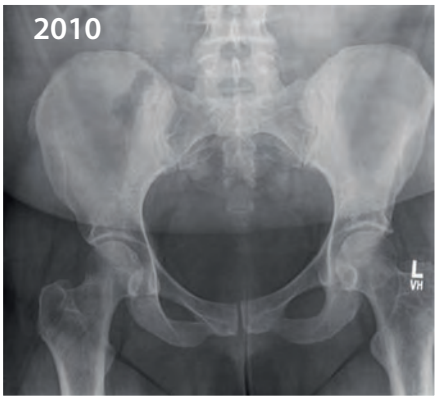


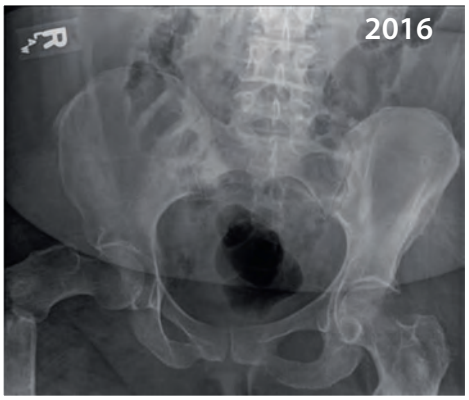


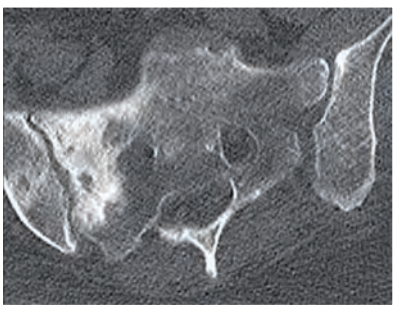
Case 48

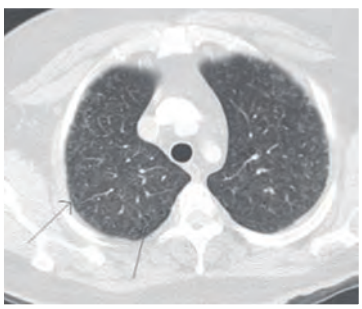
S.E. Kilpatrick, M. Sundaram
Cleveland Clinic, Cleveland, OH, USA

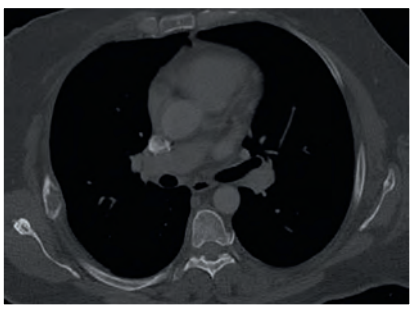
A 41 year old female, who is morbidly obese, presents with bilateral medial unicondylar arthroplasties 3 years ago and now excruciating knee pain.

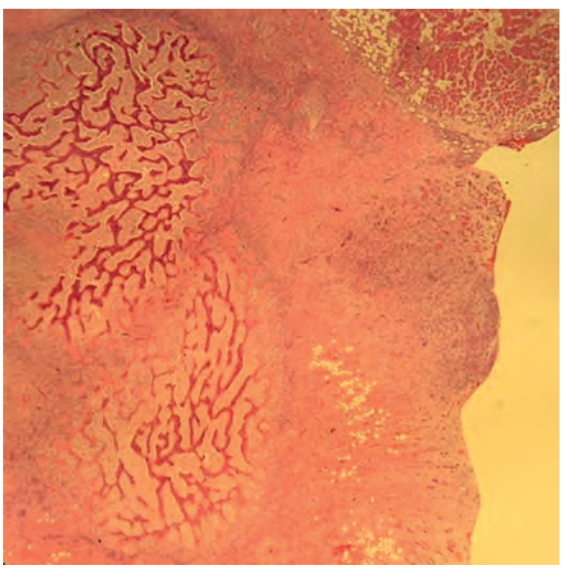


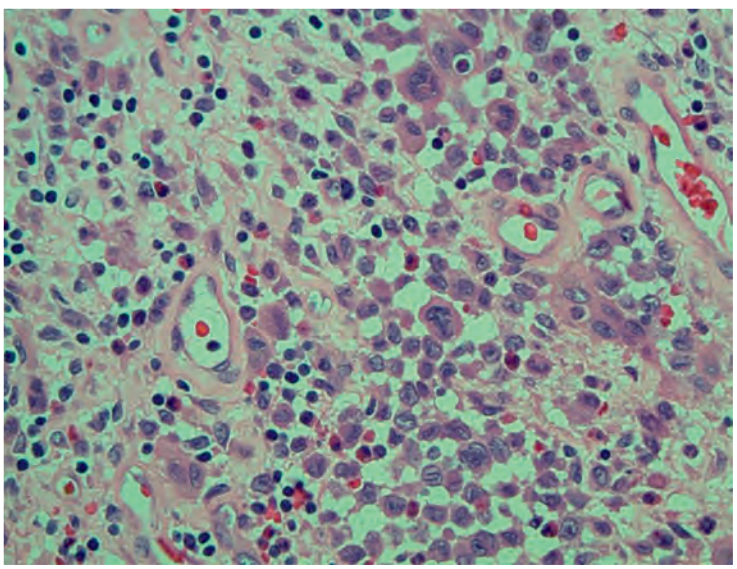












Members' Meeting

Day 4

AUGUST 2017						
Sat 26	Sun 27	Mon 28	Tue 29	Wed 30	Thu 31	Fri 1

03:45 – 05:00

Session VIII:

Moderators: Petur Nielsen, Doris Wenger

Case Presentations

03:45 **Case 49:** E.S. Gould, M.W. Teng, C.K. Ho, V.J. Vigorita, S. Hoda (SUNY Stony Brook/HSC, Stony Brook, NY; Synergy Radiology, Houston, TX and NYU Hospital for Joint Disease, New York, NY, USA)

04:00 **Case 50:** B. Bilgic, H. Ozger, B. K. Sirin, B. Alpan, N. Baliyev, O. E. Aycan (Acibadem University School of Medicine, Istanbul, Turkey)

04:15 **Case 51:** V. Zayas, G. Dieudonne, E. Carmody, X. Wang, J. Monu (University of Rochester, Rochester, NY, USA)

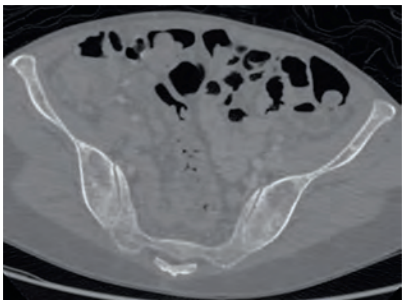
04:30 **Case 52:** V. Vasilevska, M. Samardziski, V. Janevska (University SS Cyril and Methodius, Skopje, Macedonia)

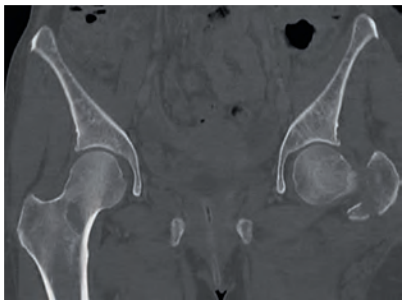
04:45 **Case 53:** J. Healey, M. Hameed, S. Hwang (Memorial Sloan Kettering, New York, NY, USA)

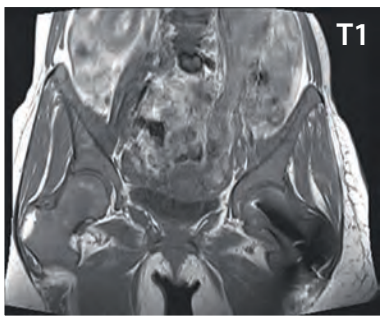
Case 49

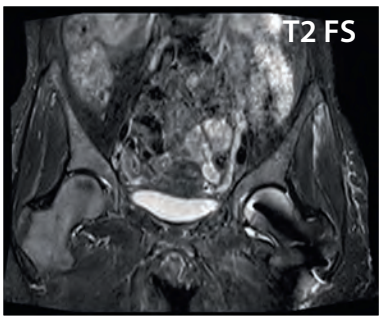
E.S. Gould, M.W. Teng, C.K. Ho, V.J. Vigorita, S. Hoda
SUNY Stony Brook/HSC, Stoney Brook, NY; Synergy Radiology, Houston, TX
and NYU Hospital for Joint Disease, New York, NY, USA

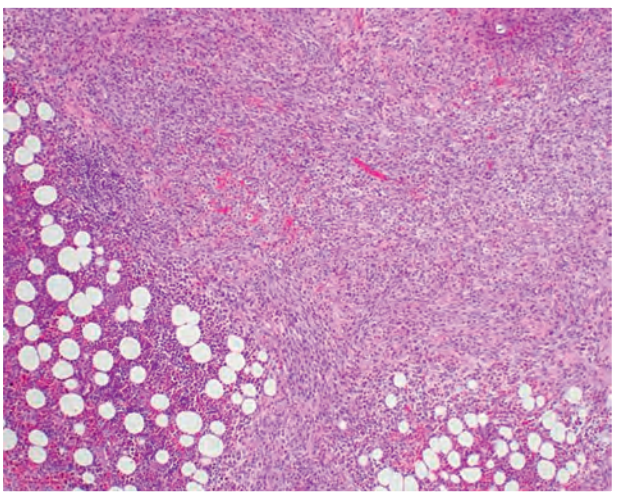
A 54 year old female fell in her house; radiographs demonstrat a left intertrochanteric fracture. Lab values reveal that she is mildly anemic with a mild leukocytosis (WBC: 11.6 K/uL), elevated ESR, CRP and ANA positivity. Free kappa light chains are identified by SPEP.

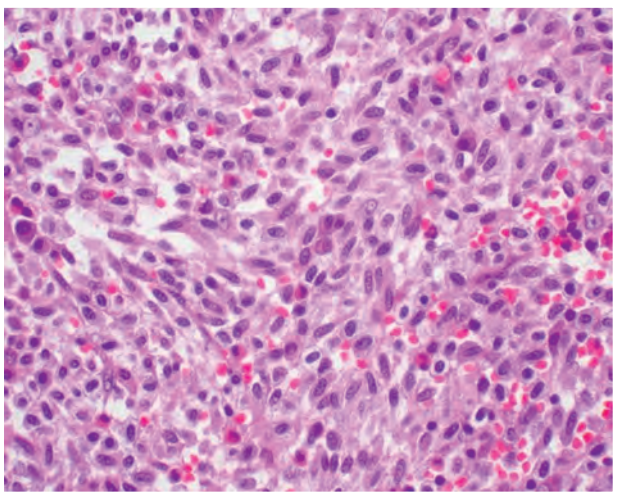








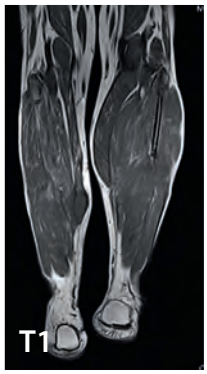


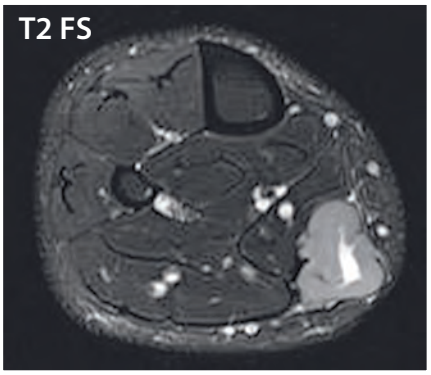


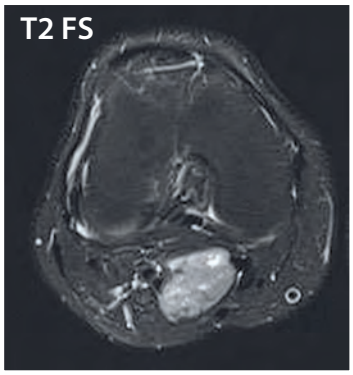
Case 50

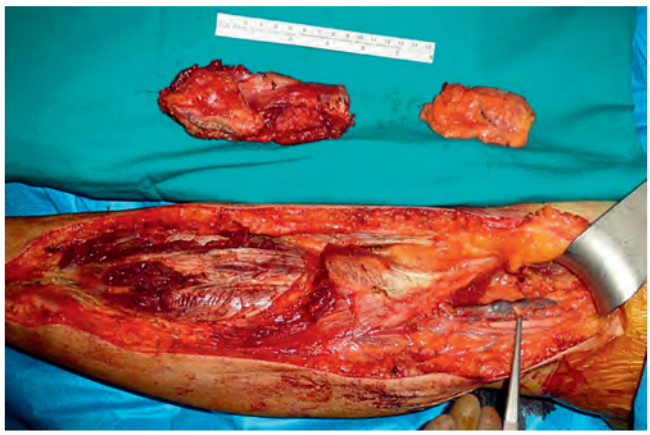
B. Bilgic, H. Ozger, B.K. Sirin, B. Alpan, N. Baliyev, O.E. Aycan
Acibadem University School of Medicine, Istanbul, Turkey

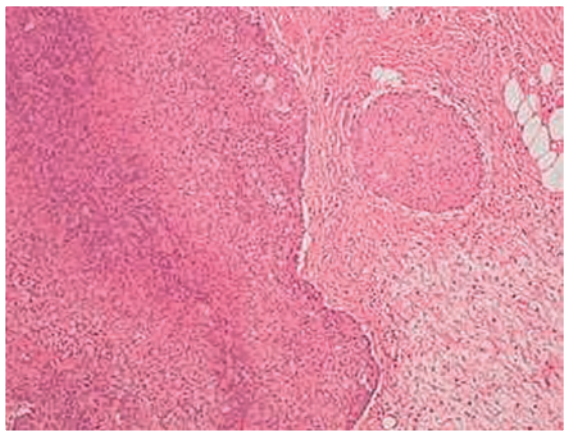
A 40 year old male presents with palpable, painful soft tissue lesions of his right popliteal region and right ankle. Several soft tissue tumor excisions had been performed elsewhere over the past 14 years.

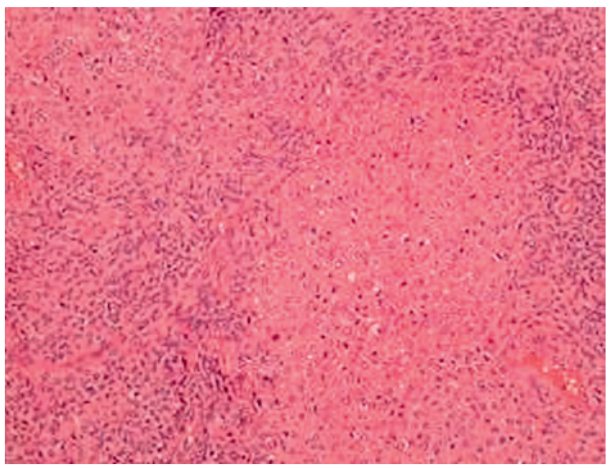


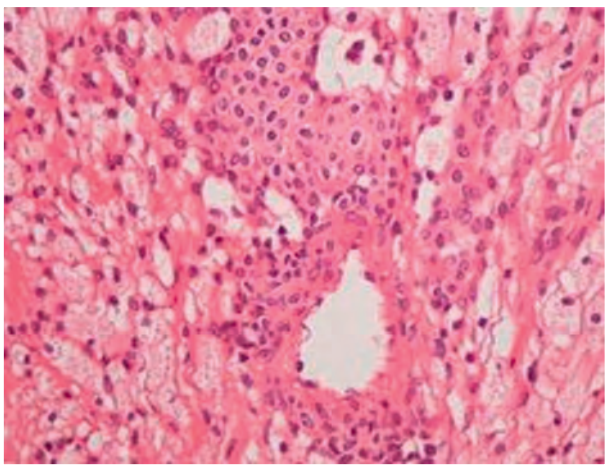








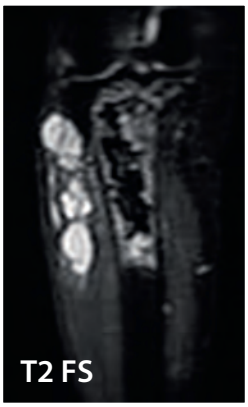


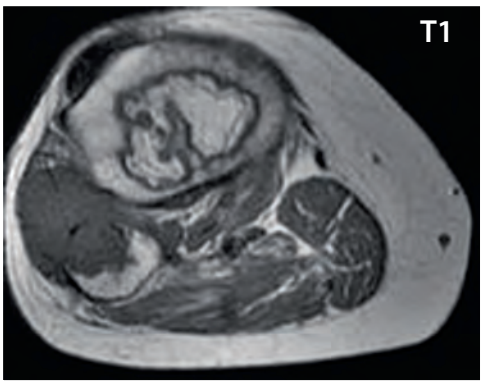


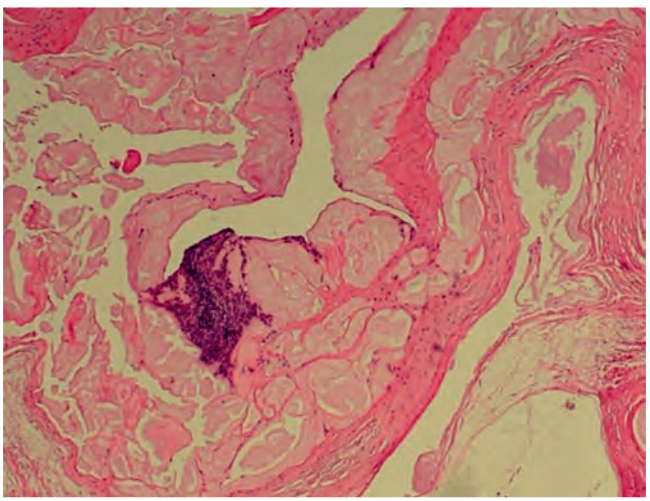
Case 51

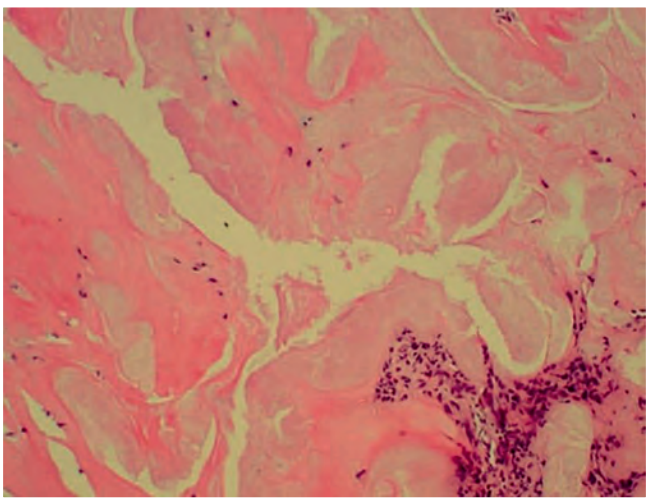
V. Zayas, G. Dieudonne, E. Carmody, X. Wang, J. Monu
University of Rochester, Rochester, NY, USA

A 58 year old female presents with one year history of left knee pain. No associated antecedent trauma. Pain has become progressively worse, over the fibular head, aggravated by activity and alleviated with rest.







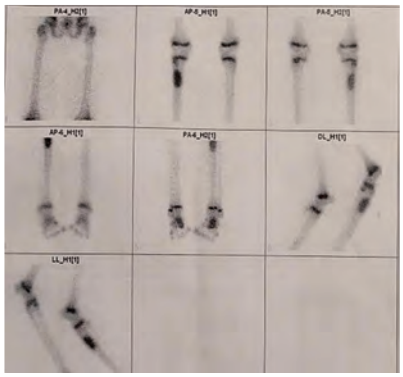
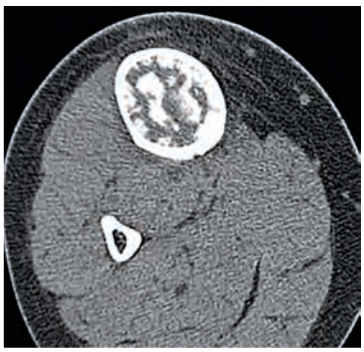


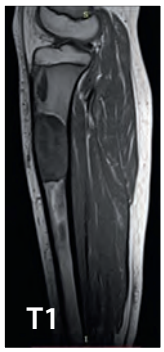
Case 52

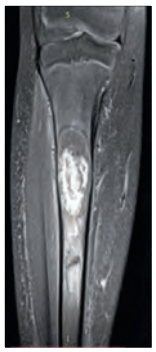
V. Vasilevska, M. Samardziski, V. Janevska
University SS Cyril and Methodius, Skopje, Macedonia

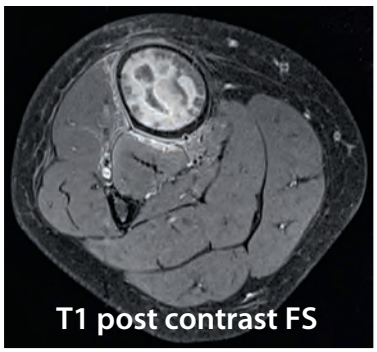
A 12 year old male presents with a history of local minor trauma two years ago and prominent pain in this area for the past 3 to 4 days, mostly at night, relieved by ibufropen (motrin/Advil).

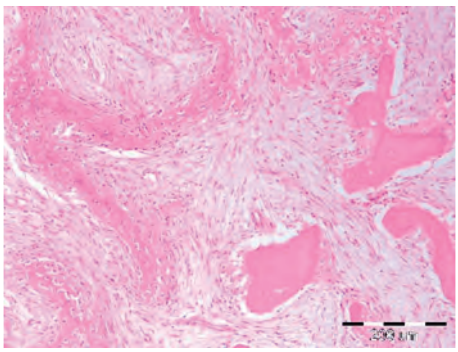
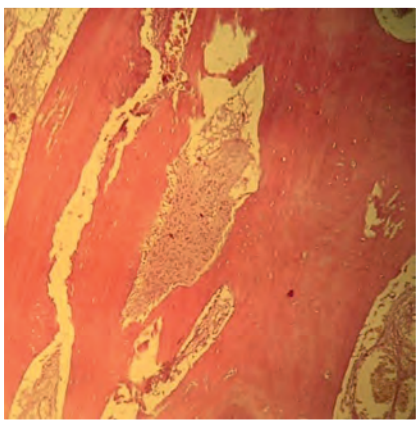
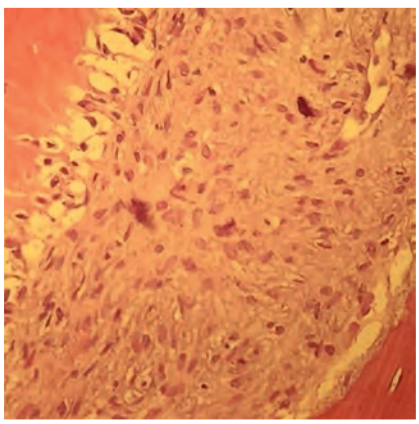








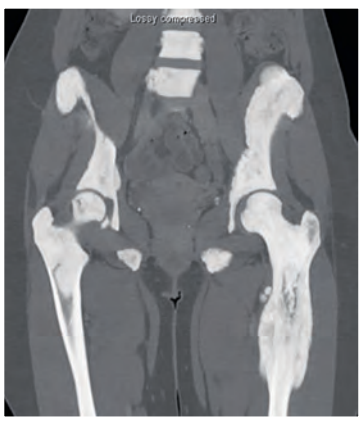
Case 53

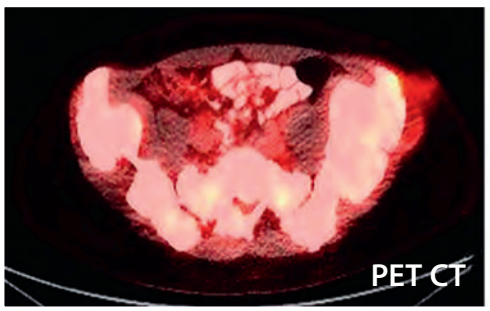
J. Healey, M. Hameed, S. Hwang
Memorial Sloan Kettering, New York, NY, USA

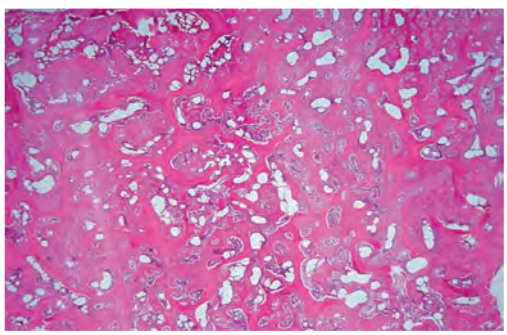
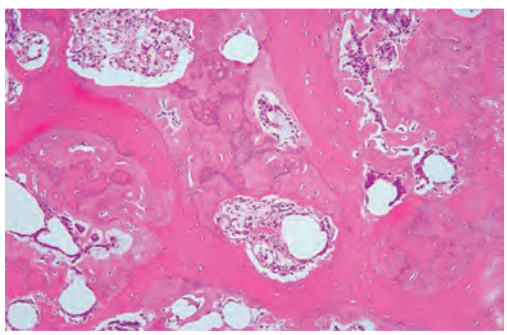
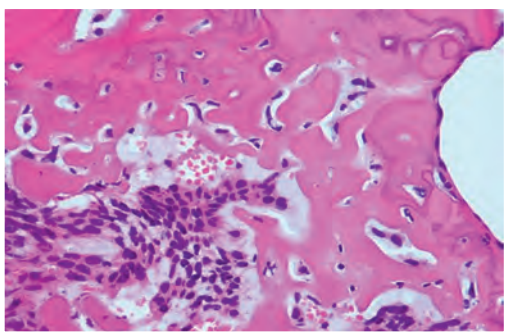
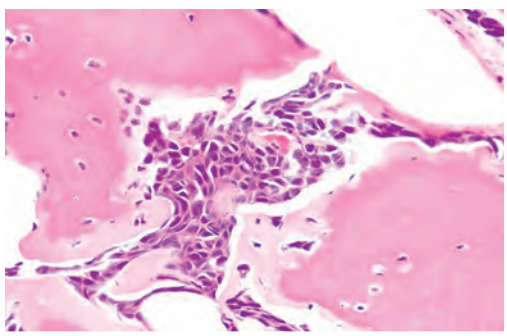
A 28 year old female missed two menstrual periods; work up revealed beta HCG: 36.17mIU/ml and Alkaline Phosphatase: 1679 U/L.







MUSCULOSKELETAL IMAGING: FUNDAMENTALS TO ADVANCED CONCEPTS

Special Scientific Session Program

Monday, August 28th, 2017, 13:30 – 17:30

Ad Hoc Scientific Session Committee: Julie Fanburg-Smith, MD, Juerg Hodler, MD, MBA, Thomas Link, MD, PhD, Reto Sutter, MD, Kathryn Stevens, MD, Martin Torriani, MD, MSc

Chair: Miriam A. Bredella, MD

Session 1

Moderators: Miriam A. Bredella, USA
Martin Torriani, USA

13:30 – 15:40

13:30. 3T MRI of proximal femur microarchitecture discriminates between subjects without and with fragility fractures. Hamza Alizai, Chamith Rajapaske, Cheng Chen, Arakua Welbeck, Punam Saha, Stephen Honig, Gregory Chang. *New York, NY, USA*

Purpose: To determine if 3T MRI of proximal femur microarchitecture can discriminate between subjects without and with fragility fracture.

Materials and Methods: This prospective study had institutional review board approval and was HIPAA compliant. From the Osteoporosis Center at our institution, we recruited 80 subjects without fragility fracture (78 female, 2 males; median age = 61.0 years, interquartile range = 10.0 years; median body mass index = 21.0 kg/m^2, interquartile range = 3.8 kg/m^2) and 41 subjects with fragility fracture (36 females, 5 males; median age = 63.0 years, interquartile range = 15.3 years; median body mass index = 22.1 kg/m^2, interquartile range = 5.9 kg/m^2). All subjects underwent 3T MRI of the same hip as scanned by DXA to assess bone microarchitecture. Standard statistical methods were used to assess discriminatory ability of parameters and correlations between total hip BMD and microarchitecture.

Results: Femoral head trabecular plate edges and rods (AUCs=0.610-0.637; CIs=0.507-0.531 to 0.714-0.742), femoral neck trabecular plate edges, rod disruption, and plate-to-rod ratio (AUCs=0.616-0.620, CIs= 0.504-0.509 to 0.726-0.730), Ward's triangle trabecular isolation, plate-to-rod ratio, and plate width (AUCs=0.613-0.649, CIs=0.509-0.543 to 0.718-0.754), and inter-trochanteric bone volume fraction and trabecular isolation, plate edges, rod disruption, number, and separation (AUCs= 0.617-0.642, CIs=0.505-0.541 to 0.728-0.743) could discriminate fracture cases from controls. Total hip BMD (AUC=0.480, CI=0.370-0.591) could not discriminate fracture cases from controls. Within the intertrochanteric region only, total hip BMD demonstrated weak correlations with bone volume fraction, trabecular isolation, plate edges, rod disruption, number, and separation (rho = -0.214 to 0.215, $p < 0.05$ for all).

Conclusion: 3T MRI of proximal femur microarchitecture can discriminate between subjects without and with fragility fracture and may provide added information about fracture risk beyond BMD.

13:40. Phase shift MRI in assessment of vertebral compression fracture: a trial for scoring system. Khaled A. Matrawy, Ihab S Reda, Abdel Aziz ElNekeidy, Alaa El-Naggar, Nadia Abdel Fattah. *Alexandria, Egypt*

Purpose: To evaluate the role of in/opposed-phase quantitative chemical shift MRI of spine in differentiating malignant from benign compression fracture

Materials and Methods: Prospective study for twenty patients with low back pain and radiological evidence of vertebral compression fractures, MR imaging of the spine at 1.5 Tesla with standard conventional MR sequences and additional chemical shift as well as DWI were done. Quantitative image analysis of regions of interest (ROI) on the abnormal marrow in the compressed (study group) and related normal vertebra in same patient (control group) was done in each patient. The signal intensity ratio (SIR) of the marrow was deter-

mined by dividing the mean signal intensity on the opposed-phase to the mean signal intensity on the in-phase images and statistical analysis was performed.
Results: Mean SIR of benign vertebral compression [0.6 ± 0.27 (range 0.23–1.1)] was significantly lower than malignant SIR values [1.115 ± 0.14 (range 0.87–1.45)] ($p < 0.0001$; area under the ROC curve, 0.97). The optimal SIR cutoff value for separating benign and malignant vertebral compression was found to be 0.9 with a calculated sensitivity of 91.5%, specificity of 87.5% and accuracy of 90%. We assumed a scoring system made of these three imaging modalities to help in directing the assessment of collapsed vertebrae, with considering each positive finding of malignancy as a point: Conventional MRI, consider convex posterior border, epidural soft tissue component in association to altered marrow signal intensity as a point. Measured SIR of the collapsed vertebra >0.9, is considered a point. Restricted diffusion, ADC values 1or less, is also considered a point.
Conclusion: Quantitative chemical shift MR imaging could be a valuable addition to standard MR imaging techniques and represent a rapid helpful tool in differentiating benign from malignant vertebral compression, regarding adequate case selection, accurate focusing on benign and neoplastic wedging. We also found an (ADC) cut-off value of 0.9, to be a statistically significant in differentiating benign from malignant causes of vertebral compression fractures.

13:50. Utility of ZTE for the diagnosis and characterization of ankle fractures with MRI. Meghan E Sahr, Alissa J Burge, Ryan Breighner, O Kenechi Nwawka, Darryl Sneag, David Helfet, Hollis G Potter. *New York, NY, USA*
Purpose: We sought to demonstrate the utility of a zero echo time MRI pulse sequence to diagnose and characterize fractures in the setting of ankle trauma.
Materials and Methods: Institutional Review Board Approval was obtained. Patients provided informed consent for the additional ZTE sequence. Patients with a history of ankle surgery, contraindications to MRI or who were referred for other indications were excluded. Ankle MRI was performed on a 3T scanner (GE healthcare, Waukesha, WI) with sagittal STIR, axial, coronal and sagittal proton density, and a vendor-supported (GE) prototype sagittal ZTE sequence. Fractures diagnosed prospectively in the radiologist's report were confirmed by operative report for surgically managed cases. For those patients with CT scans available for comparison, three radiologists with a total of 9 years of musculoskeletal radiology experience (MS, AJB, OKN) independently measured the size of 8 selected fracture fragments (anterior-posterior and cranio-caudal) on corresponding sagittal ZTE and CT images. Correlation coefficients with 95% CI's were calculated for the ZTE and CT measurements and for the ZTE measurements between radiologists.
Results: Fifteen patients were treated operatively and four conservatively. 23 of the 24 fractures found at surgery were diagnosed prospectively on ankle MRI with ZTE. The one missed fracture was through a medial malleolar osteophyte, which was resected. The ZTE sequences accurately characterized fracture fragments, with substantial agreement of fragment measurements made on ZTE and those made on CT (ρc 0.9873, 95% CI 0.9562-0.9964). There was substantial agreement of measurements made on ZTE by different radiologists (0.9841, 95% CI 0.9425-0.9957). In addition to fracture size, other qualitative information was well demonstrated on ZTE, such as differentiation between cartilage and subchondral bone to better detect depression and gaps at the articular surface. Cortical bone and adjacent ligaments were subjectively more easily differentiated.
Conclusion: ZTE is a useful supplemental technique, allowing for more comprehensive MR imaging evaluation of the injured ankle.

14:00. Targeted MDCT-guided ganglion impar blockade for coccydynia: efficacy and long-term treatment outcomes. Kirsty E Durley, Dora Amos, James Allman Sutcliffe, Paul Jewell, Sarah Yanny, Richard Sidebottom, Tom Meagher, Richard Hughes, David McKean. *Aylesbury, United Kingdom*
Purpose: To describe the technique of multi-detector computed tomography (MDCT) guided ganglion impar blockade for the treatment of coccydynia and evaluate the short and long-term outcome.
Materials and Methods: We performed a retrospective audit of patients who underwent MDCT-guided ganglion impar blockade injections at our institution from March 2011 to June 2016. Primary outcome measures were pain scores at 24 hours and 2 weeks post injection and the incidence of complications. Secondary measures duration of therapeutic relief, pain score at long term follow up and requirement for further interventional procedures.
Results: From March 2011 to June 2016, 27 MDCT-guided ganglion impar blockade injections were perfor-

med. Complete data was obtained for 18 patients (13 female, 5 male) who received 22 injections. Technically successful needle placement was achieved in all cases with accurate needle placement without immediate or long- term complications. Out of 22 injections, 72.7% (n=16) reported a positive diagnostic response at 24 hours and 95.5% (n=21) reported a positive therapeutic response at 2 weeks. Mean pain score pre-injections was 8.4 (range 6–10), at 24 hours mean pain score was 4.4 (0–10) and at 2 weeks the mean pain score was 3.6 (range 0–9). The mean duration of therapeutic effect was 41.3 weeks (range 0–244 weeks). Long-term follow-up pain scores were obtained for 18 patients with mean follow-up duration of 173 weeks (range 26–304 weeks). Five patients (27.8%) had subsequent pain management interventions (including further ganglion impar blockade, pudendal nerve release or coccygectomy).

Conclusion: MDCT guided injection for coccydynia allows for accurate location of the ganglion impar at the caudal end of the sympathetic chain in the retroperitoneal sacro-coccygeal region. We report very high rates of both short and long term therapeutic response to MDCT guided blockade of the ganglion impar which may be related to accuracy of needle placement. Our results demonstrate that MDCT guided ganglion impar is an effective technique to relieve intractable perineal pain of sympathetic origin in patients with chronic coccydynia.

14:10. US guided steroid injection for de Quervain's tenosynovitis; anatomy based approach. Soo-Jung Choi, Jong-Hyun Bing, Dong-Rock Shin. *Gangneung, Republic of Korea*

Purpose: To suggest different US guided steroid injection (USI) techniques based on the anatomic variation and sonographic findings of the first extensor compartment (FEC), and to evaluate the usefulness of them, in patients with de Quervain's disease.

Materials and Methods: 30 patients who underwent USI for de Quervain's disease were included. US exams were performed before the injection and classified into 1) complete subcompartmentalization, 2) distal incomplete subcompartmentalization, and 3) no subcompartmentalization, according to the presence and extent of the septum between abductor pollicis longus and extensor pollicis brevis (EPB) within the FEC. Involved subcompartments were recorded in cases with subcompartmentalization. USIs were performed based on the sono- graphic findings; 1) USIs were performed in both subcompartments or only in the EPB subcompartment, depending on the involved subcompartments, in cases with complete subcompartmentalization. 2) USIs were performed at the proximal FEC in cases with distal incomplete subcompartmentalization, and 3) USIs were performed inside the common sheath of the FEC in cases with no subcompartmentalization. VAS (visual analogue scale) was recorded before and 10 minutes after the injection. Medical charts were retrospectively reviewed for evaluation of midterm outcome at follow-up visits.

Results: 13 of 30 patients had complete subcompartmentalization within the FEC. USIs were performed only in the EPB subcompartment in 10, and in both subcompartments in three of 13 patients. Proximal injections were performed in five patients with distal incomplete subcompartmentalization. Intra-common sheath injections were performed in 12 patients with no subcompartmentalization. Mean VAS was 7.9 before the injection and 3.4 at ten minutes after the injection. 24 of 30 patients were followed with a mean period of 31 days (6 ~ 87 days). 22 of 24 patients were satisfied with the results. Mean % pain reduction was 82.7 % (median; 95%). Mean VAS was 0.6 at rest and 1.5 at work.

Conclusion: USI with different injection techniques based on the anatomic variation of the first extensor compartment is effective for management of de Quervain's disease.

14:20. Complications of cryotherapy in bone tumors. Earl Brien, Clark Chen. *Los Angeles, CA, USA*

Purpose: Complication rates using cryoablation in bone tumors have been reported higher than 25% and include fracture, infections and wound complications. Different techniques have been developed in an attempt to reduce the complication rates, including argon freezing with cryoprobes. Our objective is to determine our rate and type of complications pouring liquid nitrogen into bone defects after curettage of the bone tumor and to review our current indications and surgical technique in managing bone tumors.

Materials and Methods: We reviewed charts in over 200 patients who received cryoablation for bone tumors from 1994-2003. We evaluated the imaging studies in all patients who were diagnosed with a complication. All patients receiving cryotherapy had soft tissue management that included warm saline directed to the skin, subcutaneous tissue and in some cases the muscle. Cryotherapy was poured into the bone defect, and in some cases, additional spraying into the defect with liquid nitrogen was performed.

Results: All patients had a minimum of 12 months follow-up. The majority of cases where cryotherapy was used was in active or aggressive benign tumors. Complications included one post-operative fracture and one infection. Bone graft or cementation was used in the majority of patients. All Bone grafts incorporated and all patients were without restrictions after treatment for a benign tumor.
Conclusion: Cryoablation is an excellent form of adjuvant therapy for active and aggressive benign tumors and may be used in malignant tumors as well. The complication rate is far less than prior published reports. Soft tissue protection is critical to avoid skin necrosis and wound breakdown. We recommend the use of cryotherapy in active and aggressive benign bone tumors as an adjuvant treatment prior to bone grafting or cementation.

14:30. Single bone metastasis: role of MR-imaging-guided high-intensity focused ultrasound therapy. Alberto Bazzocchi, Daniele Mercatelli, Giancarlo Facchini, Sara Guerri, Chiara Gasperini, Maria Pilar Aparisi Gómez, Giuseppe Battista, Giuseppe Guglielmi, Alessandro Napoli, Ugo Albisinni. *Bologna, Italy*
Purpose: MR-imaging-guided high-intensity focused ultrasound (MRgFUS) is a safe and effective option for palliation of painful bone metastases. Improvement of the prognosis for patients with advanced oncological disease demands for effective and minimally invasive management. Oligometastatic disease is a special condition, and deserves special attention and opportunities. The purpose of this work is to evaluate the role of MRgFUS in patients with single bone metastasis, in terms of (A) local control of metastatic lesion and (B) pain reduction and quality of life improvement.
Materials and Methods: Between 2013 and 2015, patients with a single painful bone metastasis suitable for MRgFUS were prospectively enrolled in the study and submitted to treatment, with imaging (CT/MRI) and clinical assessment before and after 3 (minimum follow-up) and 6 months. Patients with other local treatments performed in the 3 months before recruitment were excluded. MD Anderson criteria were used to assess tumor response, and visual analogue scale (VAS) score and quality of life questionnaire (EORTC QLQ-C15-PAL) were evaluated.
Results: Fourteen patients were enrolled, and 11 patients remained in the study: 5/6 male/female, 56±13 years (range 24-78); primary cancers: breast (36.4%), liver (18.2%), kidney (18.2%), and others (27.2%); baseline lesion dimension was 9.4±2.9 cm, ranging 5.4-12.8 cm, and 54.5% of them showed a purely lytic pattern; 10/11 (90.9%) were at the pelvis; five lesions were previously submitted to other local treatments – external-beam-radiation-therapy (EBRT) (3) and embolization (2). In terms of tumor control, a complete response at 3 months was found in 2/11 patients (18.2%), a partial response in 7/11 patients (63.6%), and stable disease in 2/11 patients (18.2%). Five patients were evaluated at 6 months (2/5 complete response, 2/5 partial, 1/5 stable). No progression of the disease was observed. VAS score decreased at 3 months (from 3.8±2.8 to 1.8±2.3). No complications were observed. No further metastases occurred in the follow-up.
Conclusion: MRgFUS may achieve local control and pain palliation of bone metastasis. Further research including patients with narrowed selection criteria, in terms of size and accessibility to the ultrasound beam (eventually even not limited to painful metastasis), is needed and may reinforce the role of MRgFUS in tumor ablation and control.

14:40. Percutaneous discectomy under CT and fluoroscopic guidance: an international multicentric study about 80 patients (6 months to one year FU). Nicolas Amoretti. *Nice, France*
Purpose: To show a new technique for the percutaneous treatment under CT guidance and local anesthesia of lumbar radiculalgia in patients resistant to conservative treatment
Materials and Methods: An international multicentric study (four european centers) has been performed. Inclusion criteria were: lumbar radiculalgia with CT/MRI evidence of the hernia; pain lasting from more than one month; VAS (0-10) over 6. Both postero-lateral and trans-laminar accesses have been performed. VAS have been collected at 1 and 6 months of follow-up. The treatment has been performed by a percutaneous device that, once placed exactly into the hernia under CT and fluoroscopic control, is able through rotation to liquefy the hernia and to collect it in a container placed on top of the cannula. The goal of the intervention is the same as the gold standard intervention: to decompress and to extract the herniated disc.
Results: The VAS pre-intervention was 8 (6-10), one month away decreased to 3 (0-8) ($p < 0.001$). No significant differences were found between the centers. Only three patients left the follow-up needing surgery within the first month from intervention. Patients needing pain

killers decreased from 100% in pre-intervention to 27% at 1 month. Moreover, 91% of patients presented a modification of the VAS score within the first month and the sixth month not greater than 1 point.
Conclusion: The results show the high rate of effectiveness of this percutaneous therapy, which is performed under local anesthesia, and that presents minimal risk compared to the surgical discectomy (such as failed back surgery syndrome or intracanalar fibrosis). Also, it permits a faster return to normal life e.g returning to work (usually within one week) with evident advantage in terms of quality of life. Furthermore, the failure of this intervention doesn't threaten the possibility of a surgical solution.

14:50. Surveillance imaging in patients with tumor prostheses using anatomic and functional metal reduction MRI sequences. Laura M Fayad, Adam Levin, Carol Morris, Jan Fritz. *Baltimore, MD, USA*
Purpose: To assess the feasibility and performance of an MRI protocol including conventional and fast metal-reduction anatomic (T1/STIR, contrast-enhanced) and functional (dynamic contrast-enhanced (DCE)) imaging for the surveillance of patients who have undergone limb-salvage reconstruction with a tumor prosthesis.
Materials and Methods: Following IRB approval and informed consent, 15 subjects with history of sarcoma resection and tumor prostheses, underwent 17 MRIs at 1.5T for surveillance imaging. MRI included two-plane anatomic imaging (T1-weighted, STIR, post-contrast T1-weighted, and subtraction of pre-contrast from post-contrast images) with both conventional WARP and fast compressed-sensing (CS)-SEMAC sequences, and functional imaging (DCE-MRI with 7-second resolution). One observer recorded the quality of each sequence (1=>75%, 2=25-75%, 3=10-25%, 4=no substantial-artifacts) adjacent to and remote from the prosthesis, and the presence of recurrence by three interpretation sessions (WARP, WARP+CS-SEMAC, WARP+CS-SEMAC+DCE) using a 5-point confidence scale (definitely not present, probably not present, possibly present, probably not present, definitely present). ROC analysis was performed, using histology as the reference for positive recurrence, and minimum 6-month stability for absence of recurrence.
Results: Of 17 studies, there were 4 histologically-proven intramuscular recurrences. Average image quality was different adjacent to the prosthesis compared with remote from the prosthesis on T1, STIR and contrast-enhanced T1 sequences with subtraction imaging (WARP:1.2 vs 3.9, CS-SEMAC: 2.9 vs 3.4, respectively). ROC analysis revealed improved diagnostic performance for the detection of tumor recurrence with the successive addition of CS-SEMAC and DCE imaging to WARP (area-under-the-curve: WARP alone=0.84, WARP with addition of CS-SEMAC=0.92, WARP with addition of CS-SEMAC and DCE=1.0).
Conclusion: An MRI protocol including conventional metal reduction sequences (WARP), with the addition of fast CS-SEMAC and DCE-MRI offers good diagnostic performance for the detection of recurrence in patients with a history of limb salvage surgery and tumor prostheses.

15:00. Differentiation of malignant from benign musculoskeletal tumors at 3T: the influence of the choice of the smallest B value. Seung Hee Han, Won-Hee Jee, Ji Hyun Hong, Joon-Yong Jung. *Seoul, Republic of Korea*
Purpose: To compare the diagnostic performance in the differentiation of malignant from benign musculoskeletal tumors on the choice of the smallest b value with the same highest b value at 3 T.
Materials and Methods: The institutional review board approved this retrospective study and informed consent was waived. Thirty-six patients with primary musculoskeletal tumors who underwent MR imaging including intravoxel incoherent motion (IVIM) diffusion-weighted MR imaging (DWI) and histopathologic confirm were retrospectively analyzed. IVIM DWI was obtained with nine b values (0-800) at 3 T. Four different ADC maps were calculated from b values of 0 and 800 sec/mm^2, 50 and 800 sec/mm^2, 100 and 800 sec/mm^2, and 200 and 800 sec/mm^2 using MR Body Diffusion Toolbox. Two independent musculoskeletal radiologists drew the regions of interest (ROI) in the solid portions of the tumors. The receiver operating characteristic curves with areas under the curve (AUC) were obtained for diagnostic performance in differentiation of malignant from benign tumors. Interobserver agreement for ADC measurement was assessed using intraclass correlation coefficient (ICC).
Results: There were 17 malignant and 19 benign tumors. Sensitivity, specificity and accuracy of ADC0-800, ADC50-800, ADC100-800, and ADC200-800 were 82%, 74% and 78%; 82%, 74% and 78%; 77%, 74% and 75%; 77%, 74% and 75% for reader 1 and 82%, 79% and 81% on four ADC maps for reader 2. AUCs were 0.769, 0.786, 0.786 and 0.783 for reader 1 and 0.808, 0.805,

0.786 and 0.793 for reader 2, respectively. The optimal cutoff values of to differentiate malignant from benign tumors were 1273, 1301,1260, and 1224 μm²/sec for ADC0-800, ADC50-800, ADC100-800, and ADC200-800 on reader 1 and 1252, 1278, 1282, and 1280 μm²/sec on reader 2. Interobserver agreement were excellent (ICC = 0.98–0.99).
Conclusion: With the same highest b value, the choice of the smallest b values (0-200 mm²/sec) does not affect the diagnostic accuracy in the differentiation of malignant from benign musculoskeletal tumors at 3 T.

15:10. Solid bone tumors of the spine: diagnostic performance of apparent diffusion coefficient measured using diffusion weighted magnetic resonance imaging with histology as a reference standard. Carmelo Messina, Domenico Albano, Grazia Pozzi, Joan Almolla, Luca Maria Sconfienza. *Milan, Italy*
Purpose: To assess diagnostic performance of mean apparent diffusion coefficient (mADC) in differentiating benign from malignant bone tumors of the spine, having histology as a reference standard.
Materials and Methods: We reviewed MRI images of 116 patients with biopsy-proved spinal tumours (ST) who underwent 1.5 T MRI with T1, T2 and DWI sequences. Two radiologists independently measured mADC placing region of interest in pathologic and normal bone. Fndings were compared to histology (reference standard). ST were classified into malignant primary tumours (MPT); bone metastases (BM); benign primary tumours (BPT).
Results: mADC values of MPT (n=35), BM (n=65) and BPT (n=16) were 1.00±0.32 (0.59-2.10)´10-3 mm²/s, 1.02±0.25 (0.73-1.96)´10-3 mm²/s, 1.31±0.36 (0.83-2.14)´10-3 mm²/s, respectively. mADC was significantly different between BPT and all malignant lesions (BM+MPT) (P<0.001), between BM and BPT (P=0.008), between MPT and BPT (P=0.008). No difference was found between BM and MPT (P=0.999). A mADC threshold of 0.952 ´ 10-3 mm²/s yielded 81.3% sensitivity, 55.0% specificity. Accuracy was 76% (95% CI=63.9%-88.1%). mADC measurements had almost perfect inter-observer reproducibility (ICC=0.916; 95% CI=0.879-0.942).
Conclusion: DWI with mADC quantification is reproducible tool to differentiate benign from malignant solid spinal tumors with 76% accuracy. The mADC value of BPT are significantly higher than that of malignant tumors.

15:20. 3D printed models as aids in surgical planning for resection of pelvic tumors: our experience with 25 cases over 5 years. Jane S. Matsumoto, Jonathan M. Morris, Frank H. Sim, Michael Yaszemski, Doris Wenger, Benjamin M. Howe, Peter S. Rose. *Rochester, MN, USA*
Purpose: 3D printed individualized anatomic models created using data from a patient's cross-sectional images can aid in complex surgical planning for resection of bone and nerve sheath tumors of the pelvis. Collaboration between orthopedic surgeons and radiologists is a key step in the process. We review our experience over the past five years making life-size pelvic models for 21 patients undergoing resection of complex pelvic tumors and four patients undergoing pelvic reconstruction following previous pelvic tumor resection.
Materials and Methods: Models were created for patients with both benign and malignant tumors. These tumors included nine chondrosarcomas, two chondroblastic osteogenic sarcomas, and one each of Ewing's Sarcoma, multiple myeloma, malignant nerve sheath tumor, undifferentiated sarcoma, metastatic squamous cell cancer, fibromyxoid tumor, synovial chondromatosis, osteochondroma, Schwanomma, and Giant Cell Tumor. The patients range in age from twelve to 71 years. Surgeries included internal and external hemipelvectomies and sacrectomies. The process of 3D printing involves transferring DICOM imaging data from a high resolution CT and/or MRI study into segmentation software where the critical anatomy is separated and color coded using various automatic and manual tools. Arteries, veins, nerve roots, ribs, bladder and ureters were variably included in the models as needed. The segmented data is processed and then exported into an stl (stereolithography) file, the standard file for 3D printing. The stl file is exported to the 3D printer where materials and colors are selected. The 3D printer lays down successive layers of ultrathin material to create a physical model which accurately reflects the imaging data.
Results: The surgeons felt the models helped to define pelvic landmarks and trajectories for tumor resection. The models increased understanding of the tumors relationship to adjacent structures. The models were found to be helpful in multidisciplinary surgical discussions and were meaningful for patient and family education.
Conclusion: Overall, 3D printed models of patients with pelvic tumors offered an accurate reflection of an individual's unique anatomy which aided in planning complex tumor resection and reconstruction.

Session 2

Moderators: Juerg Hodler, Switzerland
Thomas Link, USA

15:40 – 17:30

15:40. Chest wall chondrosarcoma: are there distinctive cross-sectional imaging features. Filippo Del Grande, Shivani Ahlawat, Edward McCarthy, Laura M Fayad. *Baltimore, MD, USA*

Purpose: To review the cross-sectional imaging features of chondrosarcomas (CS) of the chest wall with pathologic correlation.

Materials and Methods: For 27 patients (18 males, 9 females) with biopsy proven CS of the chest wall, two musculoskeletal radiologists retrospectively reviewed CT (n=26) and/or MRI (n=6) in consensus. On CT, the location, character (lytic, sclerotic or mixed), mineralization percentage (none, 1–25%, 26–50%, 51–75%, >75% of lesion mineralization), as well as the presence or absence of a fracture or soft tissue mass (STM) was recorded. For MRI, the T1 and T2-weighted signal (hypointense, isointense, hyperintense to muscle), the T1- and T2-weighted signal heterogeneity (homogeneous, <50%heterogeneity, >50%heterogeneity), the post-contrast pattern of enhancement (lobular, solid) as well as signal heterogeneity (homogeneous, <25% heterogeneity, 25-75% heterogeneity, more than 75% heterogeneity), and the presence or absence of perilesional bone marrow edema/soft tissue edema and perilesional contrast enhancement were recorded. Pathologic specimens were reviewed for tumor grade (grade 1–3). Descriptive statistics were reported.

Results: The mean tumor size was 56 mm (range 20 to 151 mm). Twenty (20/27, 74%) CS were located in the ribs and 7 (7/27, 26%) in the sternum. The majority of CS presented as a lytic lesion (16/26, 62%) with <25% of mineralized matrix (13/26, 50%) and an associated soft tissue mass (22/26, 81%). Fractures were uncommon (2/26, 8%). CS were more often hypointense to muscles (4/6, 67%) on T1w sequences and hyperintense (5/6, 83%) on T2w sequences with the majority (67%, 4/6) showing a lobular enhancement pattern and less than 25% heterogeneity following contrast enhancement. Perilesional edema and enhancement were absent. On histology, 11 CS (11/27, 40%) were grade 1 and thirteen (13/27, 48%) were grade 2.

Conclusion: CS of the chest wall are generally low to intermediate grade, lytic, with little if any calcification, and are often associated with a soft tissue mass. Fractures are uncommon and perilesional edema is absent.

15:50. Natural evolution of popliteomeniscal fascicle tears over two years and its association with lateral articular knee cartilage degeneration in patients with traumatic anterior cruciate ligament tear. Julio Brandao Guimaraes, Xiaojuan Li, Luca Fachetti, Benedik Schwaiger, Alexandra Gersing, Thomas Link. *San Francisco, CA, USA*

Purpose: To assess i) the normal anatomy of the popliteomeniscal fascicles (PF), ii) the prevalence of popliteomeniscal fascicle tears (PFT) in subjects with traumatic anterior cruciate ligament (ACL) tears and their evolution over 2-years and iii) to compare knee cartilage degeneration in subjects with and without popliteomeniscal fascicle tears over 2-years.

Materials and Methods: Subjects with ACL tears (32 females and 25 males; age 32.6±8.3y; BMI 24.5±3.5kg/m^2) from a prospective study were screened for popliteomeniscal fascicle tears. Morphological (high-resolution 3D fast spin-echo) and compositional (T1ρ and T2 mapping) MR imaging was performed prior to and 2-years after ACL reconstruction. From this cohort, 14 subjects with popliteomeniscal fascicle tears were identified as well as 10 subjects without any meniscal abnormalities as controls. Also, the contra-lateral knee without trauma was analyzed as internal control. Differences of morphological and compositional parameters and their development over 2 years were compared between subjects with and without popliteomeniscal fascicles using logistic regression, adjusted for age, sex and BMI.

Results: The anteroinferior and posterosuperior fascicles were identified in all contra-lateral knees of the subjects. The posteroinferior fascicle was identified in 45% (26/57) subjects. In 24% (n=14) of the subjects with ACL tear (n=57) a popliteomeniscal fascicle tear was detected on baseline MRI. Three (21%) of these 14 subjects had a popliteomeniscal fascicle tear associated with a tear of the posterior horn of the lateral meniscus while the remaining subjects (79%) had an isolated popliteomeniscal fascicles tear at baseline. One subject with an isolated popliteomeniscal fascicle tear developed a meniscal tear in the posterior horn of the lateral meniscus over 2-years. Cartilage ΔT1ρ of the lateral femur increased significantly more in subjects with isolated popliteomeniscal fascicle tears compared to controls (mean difference, 2.0±2.9 vs. -1.3±1.6, p=0.027), suggesting accelerated cartilage degeneration in the lateral compartment over 2 years, when compared to ACL injured patients without meniscal pathology.

Conclusion: Popliteomeniscal fascicles tears detected by MRI are a common finding in subjects with ACL tears.

Subjects with these defects showed higher compositional cartilage deterioration compared to patients without meniscal pathology after ACL tear, over two years in the lateral femoral compartment, indicating accelerated cartilage degeneration.

16:00. From radiation osteitis to osteoradionecrosis: incidence and MR morphology of radiation-induced sacral pathologies following pelvic radiotherapy. Bjorn Jobke, Adrian J Meixel, Henrik Hauswald, Stefan Delorme. *San Francisco, CA, USA*

Purpose: This study investigated the incidence rate, latency time to onset and reconversion, MRI pattern changes over time and occurrence of insufficiency fractures of radiation-induced changes in the sacrum following radiotherapy.

Materials and Methods: 410 patients (367 female, 43 male) with pelvic malignancies treated with radiotherapy were reviewed. Follow-up was 1-124 months (mean 22 months). Total external dose was between 12 and 65Gy (mean 45,2Gy) in 1-36 fractions (mean 26 fractions). Serial CT and MRI studies (average 4 studies/patient) were analyzed using a new semi-quantitative score for the sacrum (RICOS). A size-category for the extension of the sacral signal changes (I/II/III), a type-category for MR signal morphologies (a/b/c) and insufficiency fractures (+/-) were applied.

Results: Seventy-two patients (72/410, 17.6%) were found to have new pathological signal changes. The size distribution was similar for all three categories (I:31.9%; II:36.1%; III:29.2%). Radiation osteitis (type-category: a+b) was documented in 51.4% and 33.3%, respectively, while definite osteonecrosis (type-category: c) was found in 15.2%. Thirty-one patients had sacral insufficiency fractures (43.1%). Initial bone marrow signal changes were found 1-35 months (mean 4 months) after radiotherapy, the maximum after 1-35 months (mean 11 months). Fifty-five cases (55/72, 76.4%) showed a significant reconversion within a time period of 20 months average (range: 1 to 113 months). Six cases (6/72, 8.3%) even demonstrated a complete reconversion.

Conclusion: Radiation-induced bone marrow changes appear with a high incidence after pelvic radiotherapy with an early onset and rapid reconversion. The majority presented a pattern of radiation osteitis, whereas osteoradionecrosis is rare.

16:10. Cartilage damage pattern in children and adolescents with patella dislocation: does chronicity and injury mechanism matter? Rebecca Greenstein, Hee K Kim, Shital Parikh, Neil Rajdev. *Cincinnati, OH, USA*

Purpose: To evaluate cartilage damage in patients with patella dislocation based on the recurrence and mechanism of injury.

Materials and Methods: Ninety-four patients with patella dislocation (15 years±2.5 years, 50 female, 44 male) and 66 age and gender matched subjects without patella dislocation (35 female, 31 male) were included. Patellar cartilage damage was assessed using conventional MR (grade 0-4) and T2 relaxation time mapping at three locations (medial, central and lateral). The patella dislocation group was subdivided; first-time (n=44) vs. recurrent (n=50) dislocation and traumatic (n=51) vs. non-traumatic group (n=43). Cartilage damage grade and T2 values were compared between the dislocation and matched control groups and between the subgroups (t-test). Age and gender were compared between the subgroups (t-test). Time between the initial dislocation and MR imaging was recorded and correlated with cartilage damage grade and T2 values (Pearson correlation).

Results: In the group with patella dislocation, T2 relaxation times of the patellar cartilage were significantly longer than the group without dislocation at the medial (37.2 msec vs. 32.3 msec, P value <0.0001) and central portions (35.5 msec vs. 31.6 msec, P value <0.0005). The highest cartilage damage (grade 4) was most commonly seen at the medial facet. The subgroup of traumatic patella dislocation had a significantly higher grade of cartilage damage than the subgroup with non-traumatic injury at the medial and central portions of the patella (P<0.05). There were no other significant differences between the first-time and recurrent dislocation. No age and gender differences were seen between subgroups. There was no correlation between the time interval and cartilage damage grade and T2 values.

Conclusion: In patients with patella dislocation, patellar cartilage damage occurs at the medial as well as the central portion. Traumatic dislocation has higher grade of patella cartilage damage than non-traumatic dislocation. Recurrence and time since dislocation do not affect the degree or extent of patellar cartilage damage.

16:20. Evaluation of structural damages by magnetic resonance imaging in patients with non-radiographic axial spondyloarthritis. Aline Serfaty, Clarissa Canella, Marcelo Bordalo, Erick Malheiro Leoncio Martins, Bruno Schau, Edson Marchiori. *Rio de Janeiro, Brazil*

Purpose: To determine the incidence of structural damage of sacroiliac joints (SIJ) and the spine on magnetic resonance imaging (MRI) in patients with non-

radiographic axial spondyloarthritis (nr-axSpA) and to correlate the frequency of these findings with clinical and laboratory data.

Materials and Methods: From October 2012 to September 2014, thirty-two patients with nr-axSpA (according to the classification criteria of ASAS) were enrolled in the study and subsequently underwent clinical, laboratory examinations and MRI of the whole spine and SIJ. Structural damages were assessed using two scoring systems: SPARCC MRI SIJ for the quantification of erosion, fat metaplasia, backfill and ankylosis in the SIJ; and FASSS for the evaluation and quantification of fat metaplasia in the spine. Indeed, the presence of erosion and ankylosis in the spine were also recorded. Inflammatory lesions of the SIJ were also assessed by SPARCC scoring system. Each MRI was reviewed independently by two musculoskeletal radiologists. Written informed consent was obtained from all patients.

Results: Ninety percent (n=29) of the patients with nr-axSpA presented structural damages on MRI. Erosion was the most common structural damage (81%, n=26 patients), being observed exclusively in the SIJ. Fat metaplasia was the most frequent structural change in the spine, being visualized in 37% of the patients (n=12) and the dorsal segment was the most commonly affected. Active sacroiliitis (defined by a SPARCC score higher than 2 points) was observed in 58% (n=17) of the patients with structural changes. Applying the Mann-Whitney Non-Parametric Hypothesis test (MW), a significant association ($p<0.05$) was observed between the frequency classes of the total SPARCC score for structural damage in the SIJ and HLA B27-positive patients. Very high disease activity, according to ASDAS index, was observed in 34% of the patients (n=11) and limited function, according to the BASFI index, was observed in 59% (n=19).

Conclusion: The majority of patients with nr-axSpA presented structural damages on the MRIs. Structural damages were more prevalent in the SIJ than in the spine and erosion was the most common lesion. Fat metaplasia was the most common lesion in the spine and it was more frequent in the dorsal segment.

16:30. Thoracolumbar spine involvement in patients with juvenile idiopathic arthritis: an assessment with MRI. F. Bilge Ergen, Onur Taydaş, Üstün Aydıngöz, Selcan Demir, Yelda Bilginer, Seza Özen. *Ankara, Turkey*

Purpose: The purpose of this study is to assess on MRI thoracolumbar spine involvement in patients with juvenile idiopathic arthritis (JIA).

Materials and Methods: Patients who underwent thoracolumbar MRI that referred from pediatric rheumatology for the assessment of known or suspected JIA were evaluated. Between January 2015–2017, 154 patients reviewed and from those who had definitive clinical diagnosis of as JIA retrospectively re-examined by a musculoskeletal radiologist for the presence of inflammatory lesions (central/corner lesion, apophyseal/costovertebral inflammation, supraspinous or interspinous enthesitis) as well as erosions (wedging, central erosion).

Results: There were 40 patients (mean age, 15.3±2.6) with a definite diagnosis of enthesitis-related arthritis (ERA) (n=33), oligoarticular (OA) (n=4), polyarticular (PA) (n=3) JIA and psoriatic arthritis (PsA) (n=1). In 23 (56%) patients, there was at least one inflammatory lesion (18 ERA, 2 OA, 2 PA JIA and 1 PsA) and in 3 patients with ERA at least one erosive lesion was suggestive of JIA. Only 1 patient with ERA had both inflammatory and erosive lesions.

Conclusion: Although current literature indicates that spinal MRI, as a diagnostic tool, shows insufficient evidence for detecting early JIA, we demonstrated with this study that a substantial group of patients shows at least one inflammatory or erosive lesion suggestive for the diagnosis of JIA. Prospective studies are needed for determining the incidence of spine involvement in patients with JIA.

16:40. Gout, radiographic incidence and progression of tibiofemoral osteoarthritis, patient reported symptoms and knee replacement; data from the osteoarthritis initiative. Nima Hafezi-Nejad, Ali Guermazi, Frank W. Roemer, Shadpour Demehri. *Baltimore, MD, USA*

Purpose: To evaluate the risk of radiographic incidence and progression of tibiofemoral osteoarthritis (OA), patient-reported symptoms, and knee replacement (KR) in subjects with and without previous and recent diagnosis of gout.

Materials and Methods: Data from the Osteoarthritis Initiative (OAI) study (2006–2016) was utilized. Patient-reported diagnosis of gout at the baseline and during each annual follow-up examination (as a time-dependent variable) were used as the exposure of interest. Outcomes were selected as follow: 1. Radiographic incidence of knee OA: defined as a Kellgren and Lawrence (KL) grade of 2 or worse (with or without Joint Space Narrowing (JSN)) in follow-up evaluation of knees with baseline KL grade of 0 or 1. 2. Radiographic progression of JSN: determined as whole or partial grade worsening of the Osteoarthritis Research Society International (OARSI)

JSN score. 3. Patient-reported symptoms: evaluated using Western-Ontario and McMaster University (WOMAC) questionnaires for pain and disability. Non-Acceptable Symptomatic State (NASS) was defined as WOMAC combined normalized score of greater than 80 (out of 200) for at least one or two consecutive years. 4. Adjudicated KR episodes. Potential baseline confounders including age, gender, BMI, level of physical activity, symptoms and radiographic signs of OA were included in the adjusted models (for calculation of adjusted Hazard Ratios (aHR)).

Results: In the crude and adjusted models, knees with gout had similar risk of radiographic incidence (KL grade >=2: aHR: 0.84(0.56–1.28), P-value: 0.423) and progression (OARSI JSN score whole grade increase: aHR: 0.90(0.69–1.19), P-value:0.476) of OA. However, knees with gout had significantly higher risk of patient reported symptoms (NASS for at least one year: aHR: 1.47(1.21–1.80), P-value<0.001), independent from patients' baseline age, gender, BMI, level of physical activity, symptoms, and radiographic signs of OA. Knees with gout had significantly higher crude risk of KR (HR: 1.57(1.11–2.23), P-value:0.011). Nevertheless, this association was diminished after adjusting for confounders including symptoms and radiographic signs of OA (aHR: 1.13(0.78–1.62), P-value:0.524).

Conclusion: Our long-term results demonstrate that gout is associated with similar risk of radiographic incidence and progression of knee OA, higher risk of patient reported non-acceptable symptoms, and higher risk of KR that is explained by worse symptoms and other baseline confounders.

16:50. "Early draining veins sign" on additional CT arteriography: for the differential diagnosis of soft tissue infection. Dong-ho Ha, Tae Eun Kim. *Busan, Republic of Korea*

Purpose: To evaluate incidence of "early draining veins sign" on CT arteriography (CTA) in in the patients with acute diffuse swelling of lower extremity and clinical usefulness for the diagnosis of soft tissue infection

Materials and Methods: This study was approved by our IRB. When enhanced CT of lower extremity was performed, CTA were obtained additionally. We evaluated the "early draining veins sign", defined as accompanying, multiple dilated veins on CTA. The lesion enhancement on CT images was also examined. The frequency of these imaging findings was examined in patients diagnosed each disease. And, the patients were classified into two groups depending on the presence of infection. We examined whether these imaging findings are useful for the differential diagnosis of soft tissue infection.

Results: The patients with cellulitis (34/43, 79.1%), DM foot with infection (9/11, 81.8%), and myositis (3/5, 60%) showed high incidence of "early draining veins sign". The lesion enhancement were observed frequently in patients in cellulitis (37/43, 86.0%), DM foot with infection (11/11, 100%), myositis (5/5, 100%), hemorrhage with/without hematoma (12/23, 52.2%), and compartment syndrome (5/11, 45.5%). Both imaging findings was statistically useful statistically for the diagnosis of soft tissue ($p<0.05$). The specificity of "early draining veins sign" (91.6%) was higher than that of lesion enhancement (59.0%), with statistical significance ($p<0.05$).

Conclusion: The "early draining veins sign" on CTA can be useful with high specificity for the differential diagnosis of soft tissue infection in patients with acute diffuse swelling of lower extremity.

17:00. ESSR Award Paper - Quantitative Muscle Ultrasound as An Imaging Biomarker for Frailty Syndrome. R. Mirón Mombiela, J. Vucetic, P. Monllor, F. García, F. Facal de Castro, C. Borrás. *Valencia, Spain*

Purpose: Many anatomical structures, like muscle, have repeating subunits and therefore fractal properties. It is theorized that progressive loss of complexity in the fractal architecture of muscle can characterize both aging and frailty. The primary objective was to compare Echo Intensity (EI) to muscle fractal analysis as a more accurate imaging biomarker for frailty syndrome. The secondary objective was to determine if fractal analysis of muscle structure by ultrasound is correlated with decreased muscle strength and frailty in the elderly.

Materials and Methods: A cross sectional study was performed with subjects under 60 years old who participated as controls, and 60 years old or older who participated in the experimental group. This latter group was subdivided into robust, pre-frail and frail individuals, according to the frailty criteria. The anterior compartment of the thigh was measured by B-mode ultrasound obtaining cross-sectional images. EI1 values were obtained using the Image-J software from 1 image. A ROI of the muscle was selected and the histogram function was applied. For the muscle fractal analysis we used the service of QUIBIM, an imaging biomarker company. The US studies was processed using 2D box-counting techniques where the fractal dimension parameter (D^{2D}) and mean EI from 4 images (EI2) were calculated (Fig. 1 and 2).

The muscle strength values were measured using a hand dynamometer. The statistical analysis was performed with SPSS software.

Results: A total of 48 subjects were included in the study (12 subjects in each group). EI1 and EI2 showed a negative correlation with muscle strength (EI1: r = -0.236, p >0.05; EI2: -0.292; p <0.05), and positive with frailty (EI1: r = 0.439, p <0.01; EI2: 0.515; p <0.01) and fractal dimension (EI1: r = -0.438, p <0.05; EI2: -0.537; p <0.05). The data also showed statistical differences between EI1, EI2 and muscle strength in the different stages of frailty (p <0.05), but not for D^{2D}.

Conclusion: Our latest results suggest a relevant influence between fractal analysis and EI in the context of the frailty syndrome, and the possible use of EI as an imaging biomarker for its identification. These results also suggest that fractal analysis is a good method to characterize muscle complexity by ultrasound.

17:10. SSR Award Paper – Diagnosis of superior glenoid labral tears using MRI and MRA: a systematic review and meta-analysis. John S. Symanski, James Babb, Soterios Gyftopoulos. *New York, NY, USA*

Purpose: Superior glenoid labral tears remain one of the most common causes of shoulder pain and loss of shoulder function. The clinical presentation for this group of patients can be non-specific. Thus imaging, in particular, MRI plays an important role in diagnosis. Currently, there is no consensus in terms of the most appropriate type of MRI to be used in this setting. The objective of this study was to evaluate the diagnostic accuracy of non-enhanced magnetic resonance imaging (MRI) and magnetic resonance arthrography (MRA) for diagnosis of superior labral tears in the shoulder.

Materials and Methods: We performed a literature search (until August 2016) using PubMed (MEDLINE), Embase, ISI Web of Science, Scopus, and national/international conference databases. The inclusion criteria consisted of original research studies that assessed the diagnostic accuracy of MRI, direct (d) MRA, and/or indirect (i) MRA for the detection of superior labral (SLAP) tears, while using arthroscopic findings as the reference standard. The methodological quality of each study was assessed with the use of the QUADAS 2 (Quality Assessment of Diagnostic Accuracy Studies) tool. Pooled sensitivities and specificities, and summary receiver-operating characteristic curves were calculated for each imaging strategy. Additional subgroup analyses compared 3T and 1.5T examinations of dMRI and MRA studies as well as low bias MRI and MRA studies. Study homogeneity was assessed visually on the basis of observed differences between study characteristics and methodologies, examination of the forest plots, and Cohran's Q tests of heterogeneity.

Results: There were a total of 32 studies that met our inclusion criteria, including a total of 3524 total imaging examinations (1963 d-MRA, 1393 MRI, 159 iMRA). The sensitivities of dMRA, MRI, and iMRA for diagnosis of SLAP tear were 80.4% (CI 74.6-92.1), 63.0% (46.0-79.4), and 74.2% (66.1-81.6), respectively. The specificities of dMRA, MRI, and iMRA for diagnosis of SLAP tear were 90.7% (85.3-94.9), 87.2% (77.2-94.7), and 66.5% (52.3-79.2), respectively. The sensitivities of 3T dMRA and 3T MRI were 84.4% (74.7-92.1) and 78.4% (67.3-87.8). The specificities of 3T dMRA and 3T MRI were 95.2% (90.9-98.2) and 98.9% (96.6-99.9). The sensitivities of 1.5T dMRA and 1.5T MRI were 79.1% (68.9-87.7) and 81.2% (62.8-94.3). The specificities of 1.5T dMRA and 1.5T MRI were 66.7% (39.3-89.1) and 81.9% (78.9-87.3). The sensitivities of the low bias dMRA and low bias MRI were 83.2% (75.2-89.9) and 61.7% (40.7-80.7). The specificities of the low bias dMRA and low bias MRI were 90.6% (81.9-96.7) and 95.1% (85.1-99.7). Heterogeneity was detected (p<0.10) for sensitivity in all cohorts except 3T MRI and iMRA as well as for specificity in all cohorts except 1.5T MRI, 3T MRI and iMRA.

Conclusion: Overall, direct MR arthrography of the shoulder may be a better imaging option than non-contrast MRI for the diagnosis of a superior labral tear. 3T MRI and 3T dMRA may be better imaging options than their 1.5T counterparts. These findings should be considered in the context of the degree of heterogeneity found in the available literature.

17:20. AMS Award Paper – Validation of asynchronous quantitative bone densitometry of the spine: accuracy, short-term reproducibility, and a comparison with conventional quantitative computed tomography. Ling Wang, Yongbin Su, Qianqian Wang, Yangyang Duanmu, Minghui Yang, Chen Yi, Xiaoguang Cheng, *Beijing, China*

Asynchronous calibration quantitative computed tomography (QCT) is a new tool that allows the quantification of bone mineral density (BMD) without the use of a calibration phantom during scanning; however, this tool is not fully validated for clinical use. We used the European spine phantom (ESP) with repositioning dur-

ing scanning and assessed the accuracy and short-term reproducibility of asynchronous QCT. Intra-scanner and intra-observer precision were each calculated as the root mean square of the standard deviation (RMSSD) and the coefficient of variation (CV-RMSSD). We also compared asynchronous and conventional QCT results in 50 clinical subjects. The accuracy of asynchronous QCT for three ESP vertebrae ranged from 1.4–6.7%, whereas intra-scanner precision for these vertebrae ranged from 0.53–0.91 mg/cc. Asynchronous QCT was most precise for a trabecular BMD of 100 mg/cc (CV-RMSSD = 0.2%). For intra-observer variability, overall precision error was smaller than 3%. In clinical subjects there was excellent agreement between the two calibration methods with correlation coefficients ranging from 0.98–0.99. A Bland-Altman analysis demonstrated that methodological differences depended on the magnitude of the BMD variable. Our findings indicate that the asynchronous QCT has good accuracy and precision for assessing trabecular BMD in the spine.

17:30. Adjourn

SCIENTIFIC PAPER PRESENTATIONS

Breakout Scientific Poster Session

Tuesday, August 29th, 2017, 12:00 – 13:00

Ad Hoc Scientific Session Committee: Julie Fanburg-Smith, MD, Juerg Hodler, MD, MBA, Thomas Link, MD, PhD, Reto Sutter, MD, Kathryn Stevens, MD, Martin Torriani, MD, MSc

Chair: Miriam A. Bredella, MD

Session 1

Moderators: Kathryn Stevens, USA
Reto Sutter, Switzerland

12:00 – 12.23

12:00. The anterolateral ligament in acute knee trauma: patterns of injury on MR imaging. Luke A.D. Lintin, David McKean, Ramy Mansour, Rajat Chowdhury, Philip Yoong, James Teh. *Oxford, United Kingdom*

Purpose: To delineate the spectrum of traumatic knee injuries associated with injury of the anterolateral ligament of the knee (ALL).

Materials and Methods: A retrospective review of 200 consecutive MRI scans undertaken for acute knee trauma was performed. Scans were excluded if there was a history of injury over 4 weeks from the time of the scan, septic arthritis, inflammatory arthropathy, previous knee surgery, or significant artefact. In each scan, the ALL was scored as normal, sprained or torn. The menisci, ligaments, and tendons of each knee were also assessed.

Results: The mean age was 27.4 years (range, 9–69 years) and 71.5 % (n=143) of the patients were male. The anterolateral ligament (ALL) was graded as ruptured in 17 cases (8.5%), sprained 58 cases (29%), normal in 116 cases (58%) and not visible in 9 cases (4.5%). Of cases with injury of the ALL (n=75), there was associated injury of the anterior cruciate ligament (ACL) in 60 cases (p=0.0001), medical collateral ligament (MCL) in 50 cases (p=0.0001), popliteofibular ligament (PFL) in 28 cases (p=0.0001), medial meniscus in 28 cases (p=0.0007), lateral meniscus in 24 cases (p=0.0002), lateral collateral ligament in 9 cases (p=0.0007), posterior cruciate ligament in 8 cases (p=0.2899), biceps femoris in 5 cases (p=0.0068), popliteus tendon in 4 cases (p=0.0667) and fluid or oedema was seen adjacent to the iliotibial band in 49 cases (p=0.0001). Traumatic marrow oedema was identified in 68 cases of ALL injury (p=0.0001). No cases of isolated ALL injury were seen.

Conclusion: ALL injury is not uncommon in acute knee trauma and is typically associated with significant internal derangement of the knee, especially anterior cruciate ligament rupture, ITB sprain, medial collateral ligament injury, meniscal tears and injury to other structures within the posterolateral corner, particularly the popliteofibular ligament.

12:06. Relationship between anterior knee pain and ultrasonography findings in young dancers. Myriam Daniele Stern, Nili Steinberg, shay Tenenbaum, Alexander Blankstein, Aviva Zeev, Itzhak Siev-Ner. *Ramat Gan, Israel*

Purpose: Anterior knee pain is a common concern among young dancers. Its main etiology, the patellofemoral pain syndrome (PFPS) is estimated at physical examination by patellar inhibition test (PIT) and grinding signs. The purpose of our study is to determine the relationship between pain or PFPS and the anatomic structures or morphologic measurements in the knee accessible by ultrasound evaluation.

Materials and Methods: 67 teenager girls (mean age 12.8±0.5), training intensively in dancing schools, undergo a physical examination of knees and an estimation of pain according to VAS scale. An ultrasound examination is performed including evaluation of all ligaments and tendons in anterior, lateral and medial aspect of

both knees, detection of fluid in suprapatellar bursa, evaluation of trochlear cartilage, measurements of trochlear groove depth and angle, and measure of the distance between patellar apex and trochlear groove.
Results: 64.2 % of right knees (52.2% of left knees resp.) had positive PFPS. Their mean VAS score was 5.3 ± 2.6 (5.2 ±2.6). Suprapatellar fluid was found in 44.8% (47.8%). Medial collateral ligament blurred border was reported in 16.4% (10.4%), Pes anserinus bursitis in 3% (1.5%), patellar tendon abnormality in 3% (3%) and focal trochlear cartilage hyperechogenicity in 1.5% (1.5%). Pain and PFSP are associated to suprapatellar fluid with p<0.001. Pain is associated to a deep bony trochlear groove (p=0. 042) and to a long distance between patellar apex and groove (p=0.024).
Conclusion: In young female dancers, suprapatellar fluid is associated to pain and PFPS. Deep trochlear groove and deviation of patella from trochlear groove are associated to pain.

12:12. Middle patellar tendon to posterior cruciate ligament (PT-PCL): a new index for tibial tubercle position in patients with patellar instability (PI). Carmelo Messina, Grazia Pozzi, Joan Almolla, Asma'a AL-Mnayyis, Luca Maria Sconfienza. *Milan, Italy*
Purpose: Tibial tubercle to trochlear groove (TT-GT) and tibial tubercle to PCL (TT-PCL) have been proposed as measures to establish PI risk. However, they need image post-processing for accurate calculation. We propose an alternate, easier method to calculate PI risk.
Materials and Methods: We reviewed knee MR images of 30 patients (13f,17m; 45±17y) with history of PI. MR images of 60 patients with no history of PI (36f,24m; 32±13y) served as controls. TT-PCL was calculated on two superimposed T2-weighted axial images separately by two operators. Then, the same operators separately selected the axial image where the PCL root was seen. There, the middle point of PT was calculated. A line parallel to the posterior tibial plateau was traced, two lines passing for the middle PT and medial edge of PCL were traced, and their distance calculated (PT-PCL). Differences of TT-PCL and PT-PCL between patients and controls, their correlation, and interobserver reproducibility were calculated.
Results: PT-PCL distance was 23.5±3.8mm in patients and 20.0±2.7mm in controls (P<0.001). TT-PCL distance was 22.9±3.9mm in patients and 20.5±2.7mm in controls (P=0.002). Correlation between PT-PCL and TT-PCL was r=0.838, P<0.001. Interobserver reproducibility of PT-PCL and TT-PCL was very high (ICC=0.894, CI95%=0.839-0.930 and ICC=0.866, CI95%=0.796-0.912, respectively).
Conclusion: PT-PCL significantly correlates with TT-PCL with high interobserver reproducibility. Thus, PT-PCL may represent an alternate index to calculate PI risk, with the great advantage of being calculated on a single MR image, with no need of post-processing. A PT-PCL value >21.75 mm may be used for increased PI risk.

12:18. Mucoid degeneration of the anterior cruciate ligament and its association with medial tibiofemoral osteoarthritis progression: data from the osteoarthritis initiative project. Nima Hafezi-Nejad, Robert M Kwee, Bashir Zikria, David J Hunter, Frank W Roemer, Ali Guermazi, Shadpour Demehri. *Baltimore, MD, USA*
Purpose: To determine whether anterior cruciate ligament (ACL) mucoid degeneration diagnosed on 3T magnetic resonance imaging (MRI) is associated with 2-year radiographic progression of medial tibiofemoral compartment (MTFC) joint space loss (JSL).
Materials and Methods: In our IRB-approved and HIPAA-compliant study, index knees of six hundred participants (41% men; median age 61 years, range 45-79) from the Osteoarthritis Initiative (OAI) Project were included. ACLs were evaluated by MRI at baseline. Minimum joint space width (minJSW) in MTFC was radiographically assessed at baseline and after 2 years. Multivariable logistic regression analysis identified the association of ACL mucoid degeneration with JSL progression, defined as minJSW decrease >0.7 mm. Adjustments were performed for age, gender, BMI, baseline WOMAC pain score, and baseline MTFC minJSW. Data were stratified according to baseline Kellgren-Lawrence (KL) and Osteoarthritis Research Society International (OARSI) joint space narrowing grade to assess for interaction.
Results: ACL mucoid degeneration was observed in 83/600 (13.8%) participants. Knees with ACL mucoid degeneration more often showed JSL progression compared to knees with a normal ACL (64% vs. 47%, P=0.004). ACL mucoid degeneration was associated with JSL progression (adjusted odds ratio=1.68, 95% confidence interval= 1.02-2.77, P=0.041). Participants with mild knee osteoarthritis, defined as baseline KL grade ≤2 and OARSI grade 0, more likely demonstrated JSL progression compared to participants with baseline KL grade >2 (P=0.027 and higher OARSI grades (P<0.001), respectively.

Conclusion: ACL mucoid degeneration is associated with 2-year radiographic progression of MTFC JSL, especially in knees with mild baseline radiographic features of osteoarthritis.

Session 2

12:30 – 13:00

12:30. Rapid proton density, T1 and t2 mapping for comprehensive HIP cartilage evaluation with magnetic resonance fingerprinting. Riccardo Lattanzi, Jakob Asslaender, Martijn Cloos. *New York, NY, USA*

Purpose: The combination of T1 and T2 mapping can improve cartilage biochemical characterization. However, clinical implementation has not been feasible with standard methods. Here we describe a novel technique, based on the principles of magnetic resonance fingerprinting (MRF), to enable rapid mapping of Proton Density (PD), T1 and T2 for comprehensive assessment of the hip cartilage in clinically acceptable scan time.

Materials and Methods: The MRF sequence acquires 1000 highly-undersampled images, which collectively capture a distinct signal evolution (fingerprint) in each voxel. The underlying tissue properties are retrieved by matching each fingerprint to an element of a precomputed dictionary. Dictionary matching and image reconstruction were combined into an iterative algorithm to optimize signal-to-noise ratio (SNR). Gold standard T1 and T2 maps were acquired using single spin-echo phantom experiments to validate accuracy. The hip of a healthy volunteer was scanned on a 3T MR system. We reconstructed PD, T1 and T2 for six equally-spaced radially-prescribed hip sections with 0.6x0.6 mm^2 in-plane spatial resolution and 4.0 mm slice thickness. Institutional review board approval and written informed consent were obtained.

Results: Phantom validation showed good agreement between our technique and the gold standard for T1 (1077ms vs. 1086ms) and T2 (34ms vs. 36ms), in the ranges of interest for articular cartilage at 3T. In-vivo PD, T1 and T2 maps of the hip were reconstructed with high spatial resolution and acceptable SNR from a single, rapid MRF acquisition.Total scan time for all six radial slices combined was 6:20 minutes.

Conclusion: Scan time duration, as well as intra- and inter-scan variability have until now limited the adoption of quantitative MR parameters in routine clinical exams. MRF can enable reconstruction of multiple parameters from a single, fast MR acquisition. Parameters are accurate and consistent across acquisitions and MR scanners. We presented a technique based on MRF to simultaneously measure PD, T1, T2 for multiparametric cartilage assessment in clinically feasible scan time. Planned future work includes applying our technique for comprehensive morphological (PD) and biochemical (T1, or dGEMRIC if gadolium is injected, and T2) preoperative evaluation to improve assessment and staging of cartilage damage, predict risk for progression, and impact patient management decisions.

12:36. Shear-wave elastography assessment of the post-tunnel release median nerve in patients with carpal tunnel syndrome. Eric K.C. Law, Ryan K.L. Lee, James F. Griffith, Alex W.H. Ng. *Shatin, Hong Kong*

Purpose: To compare the ultrasound elasticity of the median nerve pre- and post-operatively in patients with carpal tunnel syndrome, and to evaluate the utility of the sonoelastrographic assessment of the post-operative median nerve.

Materials and Methods: In this prospective study approved by institutional review board, 28 patients with symptomatic carpal tunnel syndrome were recruited from April 2014 to September 2015. In addition to routine sonographic assessment including cross sectional area assessment, the elasticity of the median nerve was measured at 3 sites, specifically at the carpal tunnel, just proximal to the tunnel inlet, and 10cm proximal to the tunnel inlet. Measurements were recorded pre-operatively as well as 1, 3, and 12 months post-operatively. Correlation of elasticity data with post-operative symptomatology and two-point clinical discrimination test was performed.

Results: 32 wrists in 28 patients (24 female; 4 male, and a mean age of 57) were studied. Within the carpal tunnel, stiffness of the median nerve pre-operatively was high with a mean pressure of 315±90kPa. After carpal tunnel release, a significant decrease in nerve stiffness was observed with elasticity measuring 219±100kPa 1-month (p=0.002); 214±78kPa 3 month (p=0.014); and 191±54kPa 1 year post-operatively (p=0.004). This decrease in median nerve stiffness correlated well with improved symptomatology and two-point discrimination. In contrast, there was no observed difference in elasticity measured just proximal to the tunnel inlet (pre-operation 190 ± 89kPa; 1 month 163 ± 78kPa (p=0.4); 3 months 174 ± 96kPa (p=0.5); and 1 year post-opera-

tively 190 ± 114kPa (p=0.99) or in the forearm tunnel (pre-operation mean 52.3 ± 29kPa; 1 month post-op 54.6 ± 22kPa; 174.44 ± 96kPa at 3 months post-op; and 190.25±114kPa 1 year post operatively).
Conclusion: Sonoelastography of the median nerve is useful in assessing patients post-carpal tunnel release, particularly when measured at the carpal tunnel and within the early (1 month) post-operative period, where the greatest drop in median nerve stiffness was observed.

12:42. Prevalence and diagnostic significance of posterior acoustic enhancement in ultrasound of solid soft tissue masses indeterminate for malignancy. Naomi J. Winn, Victor Cassar-Pullicino, Prudencia Tyrrell, Radhesh Lalam, Jaspreet Singh, Manoj Ramachandran, Jacob L Jaremko. *Oswestry, United Kingdom*
Purpose: A key goal of ultrasound imaging of soft tissue masses is differentiation of benign from malignant lesions. Currently, only a few lesions can be confidently diagnosed on ultrasound, such as ganglion cysts and simple lipomata, while the remaining lesions require biopsy and histological diagnosis. Posterior acoustic enhancement (PAE), where echoes in tissue deep to a lesion are more intense than elsewhere owing to increased sound wave transmission through the lesion, is best seen in cysts but in our experience, is also common in solid soft tissue masses. We sought to determine whether PAE could act as an indicator of malignancy in indeterminate solid soft tissue masses.
Materials and Methods: In an ethics approved, prospective study at a tertiary referral centre, ultrasound was performed on all consecutive consenting adult patients presenting with a soft tissue mass considered indeterminate on outside clinical and imaging assessment. All lesions underwent post-ultrasound biopsy to obtain a histological diagnosis. Two radiologists retrospectively reviewed the ultrasound images for PAE (present/absent), blinded to diagnosis. Other features independently assessed were lesion 3D size in mm, shape (maximum/minimum length in mm, <2=round, >2=elongated), borders, echotexture, and global impression (favour benign/malignant). Statistical significance was tested by one-way analysis of variance for continuous variables and Chi-squared test for categorical variables.
Results: Of 60 lesions, 24 were biopsy-proven malignant (40%). There was a strong trend towards higher incidence of PAE on ultrasound of malignant vs. benign lesions (58% vs 33%, p=0.056). Only 2/14 malignant masses with PAE were diagnosed as lymphoma. Radiologists also subjectively favoured malignancy in a higher proportion of lesions with PAE (88% vs 50%, p=0.007). A lesion with PAE was more likely to be round (p=0.003) and encapsulated (p=0.002), and less likely to be fibrous in aetiology at biopsy (p=0.012).
Conclusion: The strong trend toward greater posterior acoustic enhancement in malignant than benign solid soft tissue masses shows that, perhaps counter-intuitively, PAE is not simply a feature of a non-aggressive lesion, cystic lesion or lymphoma. Future study in larger patient groups is warranted to confirm PAE as a marker for malignancy. Presence of posterior acoustic enhancement in a solid soft tissue mass is not reassuring.

12:48. Quantitative 3T MRI of bone marrow adipose tissue in the HIP in osteoporosis. Dimitri Martel, Benjamin Leporq, Mary Bruno, Sean Boone, Gregory Chang. *New York City, NY, USA*
Purpose: Recent studies have revealed increased bone marrow adipose tissue (bMAT) in the spine and femur in subjects with osteoporosis (OP). MR spectroscopy (MRS) allows quantification of fat content and composition in one voxel and has revealed higher unsaturated fat content in the spine of subjects with osteoporosis. However, MRS suffers from long acquisition times, in particular to evaluate multiple subregions. Recent improvements to chemical shift-encoded MRI permits discrimination of fat and water in images as well as assessment of fat composition (un/saturation) using a fat spectrum model. Our purpose was to apply this method to evaluate bMAT fat composition of the hip in subjects with osteoporosis.
Materials and Methods: This study had institutional review board approval and written informed consent was obtained. 3T MRI of both hips was performed on 6 OP (mean age = 25.75+/-3.58y) and 7 nonOP subjects (mean age = 58.4+/-5.6y). A 3D spoiled-multiple echo gradient echo sequence was used to acquire data (n=12 echo time (TEs) emphasizing fat and water phase (in/out), TEs= n*1.2ms; TR= 16ms; FA=5°; NA = 4/pixel; bandwith = 2 kHz px-1; FOV =330mm^2; scan time = 3:30 minutes). An automatic reconstruction pipeline allowed separation of water and fat images and quantification of proton density fat fraction (PDFF); saturated (SFA), polyunsaturated (PUFA), monounsaturated (MUFA) fat; and T2*. These parameters were evaluated in the: femoral head (FH), femoral neck (FN), Ward's Triangle (WT), Greater Trochanter (GT), femoral shaft (FS), and subcutaneous White Adipose Tissue in the upper thigh (sWAT).

Results: Several significant differences between nonOP and OP subjects were found mainly in the FN and WT (given as nonOP – OP). Within the FN/WT, compared to OP subjects, nonOP subjects demonstrated higher PDFF (+8.17%/+14.75%, p<0.01), lower SFA (-7.97%/-14.15%, p<0.05), higher MUFA (+4.83%/+8.61%, p<0.05), higher PUFA (+3.14%/+5.54%, p<0.05) and higher T2*(+4.63ms/+7.62ms, p<0.05).
Conclusion: In subjects with osteoporosis, the femoral neck and ward's triangle reveal higher SFA and lower MUFA and PUFA compared to controls. Overall, 3T chemical shift encoded MRI can permit assessment of subregional differences and spatial variation in bMAT quantity and composition in clinically feasible scan times (< 4 minutes).

12:54. Clinical correlate of synovial proliferation in early rheumatoid arthritis. Ryan Ka Lok Lee, Fan XIAO, Jiang Yue, Lai-Shan Tam, James Francis Griffith. *Hong Kong, Hong Kong*
Purpose: To determine whether semi-quantitative, quantitative assessment of synovitis severity or synovial perfusion data correlates best with clinical symptoms and inflammatory markers.
Method: 116 patients (88 females, 28 males, mean age, 53±13 years) with early (i.e. symptoms < 24 months) RA underwent 3T dynamic contrast-enhanced (DCE) MRI of the most symptomatic wrist. Sequences obtained were: fat-saturated T1-weighted axial; fat-saturated T2-weighted coronal; T1-weighted coronal and fat-saturated post-contrast T1-weighted axial.
Analyses undertaken included:
1. Semi-quantitative grading of (a) synovial proliferation (RAMRIS) and (b) tenosynovitis.
2. Quantitative measurement of enhancing synovial volume (cm^3).
3. Maximum enhancement (ME) and enhancement slope (ES) of enhancing synovium derived from time-intensity curves of DCE MRI data.
4. Clinical assessment (Simple Disease Activity Index) and inflammatory markers (erythrocyte sedimentation rate, C-reactive protein).
Clinical evaluation included a determination of morning stiffness (minutes), pain score (0-10), disease activity by the Simple Disease Activity Index (which reflects the number of swollen ± tender joints) and serological inflammatory markers (erythrocyte sedimentation rate (ESR), C-reactive protein (CRP)).
Results: Synovitis and tenosynovitis was present in 113 (97%) and 81 (70%) of the 116 wrists examined. Tenosynovitis was associated with more severe synovial proliferation. Regarding clinical correlation, quantitative parameters correlated much better with patient symptoms than semi-quantitative parameters. Morning stiffness and pain correlated with total synovial and tenosynovial volume (r=0.407, p=0.028) but not with RAMRIS (r=0.165, p=0.196). Simple Disease Activity Index best correlated with ME and ES (r=0.502, p<0.001). ESR (r=0.380, p=0.002) and CRP (r=0.469, p<0.001) only correlated with ES.
Conclusion: Quantitative measures correlated with patient symptoms and serological inflammatory markers than semi-quantitative parameters. Synovial volume was more related to morning stiffness and pain while perfusion parameters were more related to disease activity and inflammation.

Notes

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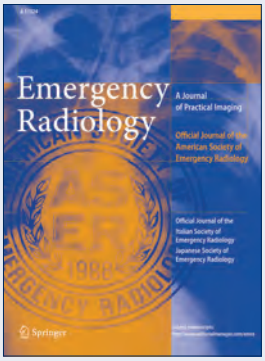

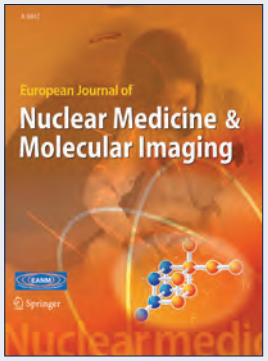

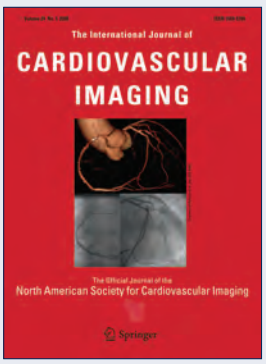

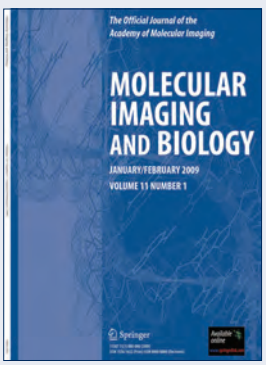

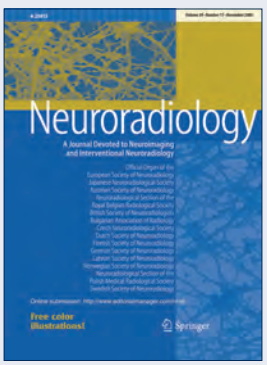

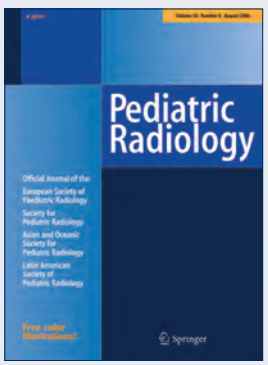

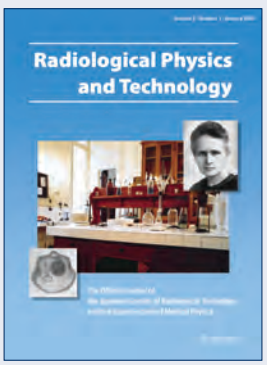

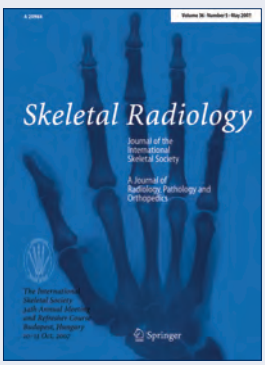

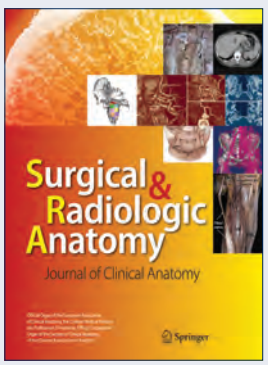

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