Imaging of the Sacroiliac Joint

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Disclosures

- Consultant: Bioclinica
- Book Royalties: Elsevier
- Contractor: POCUS PRO
- Advisory Board: Philips
- Not relevant to this talk

Syllabus and other educational material can be found at www.jacobsonmskus.com

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Take Home Points

- Synovial aspect of SI joint is not just the lower 1/3
- Joint inflammation is a diffuse process (not focal)
- Bone marrow edema is not specific
  - If focal
  - Without intra-articular findings
- Unilateral SI joint inflammation + soft tissue edema = septic joint

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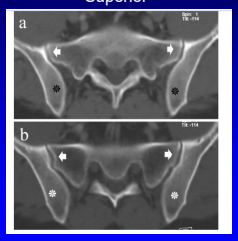
SI Joints: axial plane

Superior



Middle

Inferior

- Anterior aspect is nearly all synovial
- Posterior: inferior 1/3 is synovial
- Inflammatory conditions diffusely involve the synovial aspect

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SI Joint Pathology: radiography

- Osteoarthritis:
  - Focal sclerosis: middle (anterior) aspect
  - Inferior osteophytes
- Inflammation:
  - Diffuse sclerosis
  - Erosions: look inferior where joint is in profile
  - If unilateral: exclude septic joint

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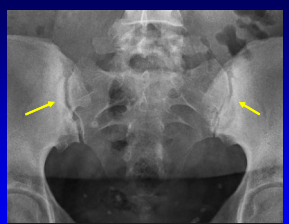
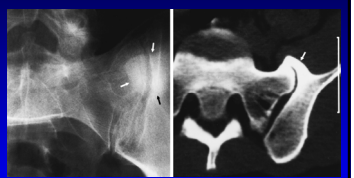
SI Joint: Osteoarthritis



*Note: sclerosis is central without erosions



*Note: bone fusion is focal and anterior from bridging osteophytes

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Osteoarthritis

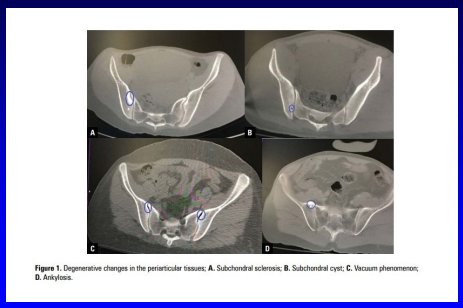

Figure 1. Degenerative changes in the periarticular tissues; A. Subchondral sclerosis; B. Subchondral cyst; C. Vacuum phenomenon; D. Ankylosis.

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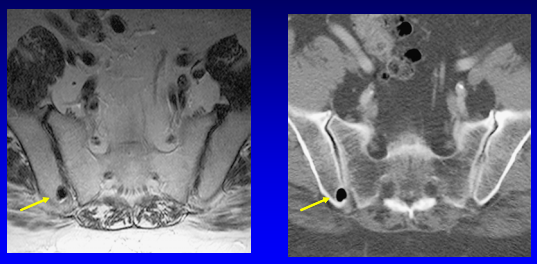
SI Joint Osteoarthritis: pneumatocyst



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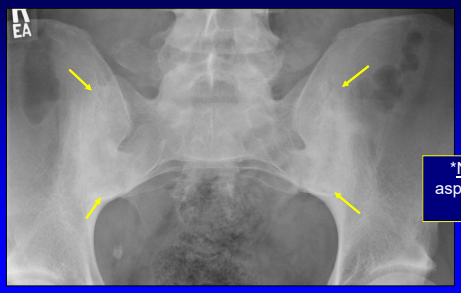
Ankylosing Spondylitis



*Note: anterior aspect is uniformly involved

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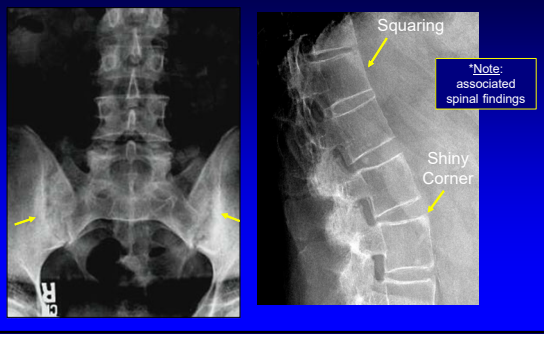
Ankylosing Spondylitis



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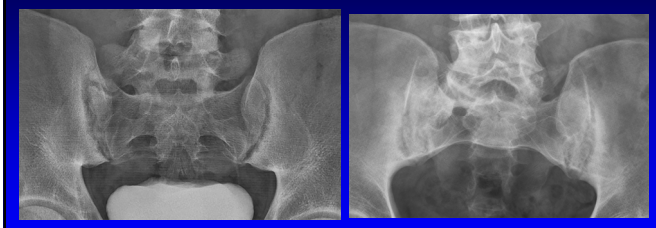
Ankylosing Spondylitis



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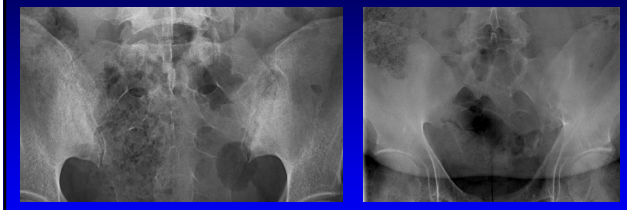
Ankylosing Spondylitis



*Note: progressive SI joint narrowing resulting in ankylosis or fusion

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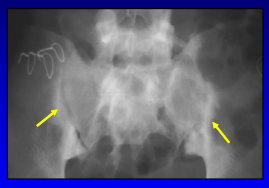
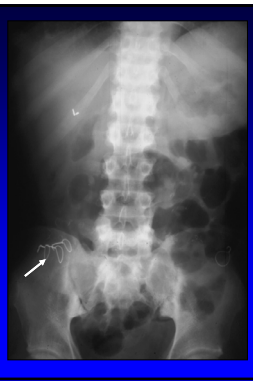
Crohn Disease





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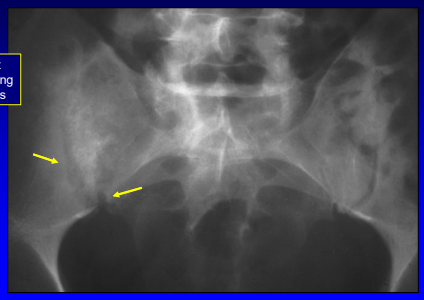
Septic Joint

*Note: joint space widening and erosions



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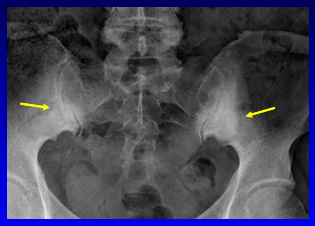
Osteitis Condensans Ilii

- Degenerative / mechanical
- Females
- Associated symphysis pubis abnormalities
- Characteristic appearance:
  - Triangle-shaped
  - Inferior aspect of ilium
  - Uncommonly sacral



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MRI: sacroiliitis

- Focal bone marrow edema:
  - Earliest sign of erosion
  - Very non-specific in isolation
- Most accurate:
  - Diffuse subchondral marrow edema
  - Joint effusion
  - Erosion: difficult to see, consider CT
  - *IV gadolinium not needed for diagnosis

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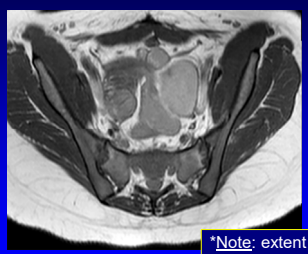
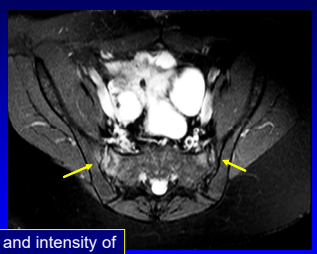
Ankylosing Spondylitis





*Note: extent and intensity of bone marrow edema, and joint effusion

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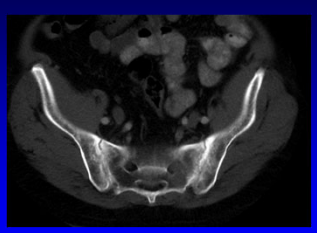
Ankylosing Spondylitis: CT



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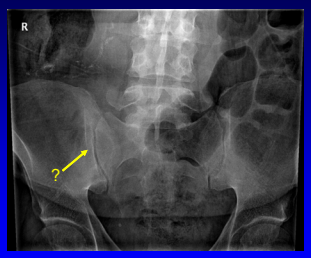
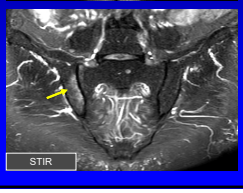
Crohn Disease





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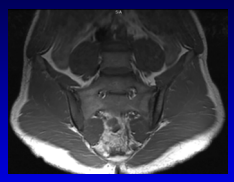
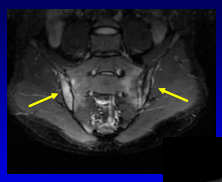
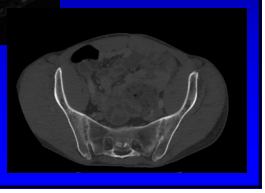
Inflammatory Bowel Disease







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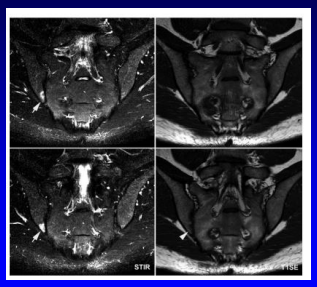
MRI: non-specific focal marrow edema

Frequency and Anatomic Distribution of Magnetic Resonance Imaging Features in the Sacroiliac Joints of Young Athletes

Exploring "Background Noise" Toward a Data-Driven Definition of Sacroiliitis in Early Spondyloarthritis

Ulrich Weber,[1] Anne Grethe Jurik,[2] Anna Zejden,[3] Fjnar Larsen,[3] Steen Hyldgaard Jørgensen,[3] Kaspar Rufibach,[4] Christian Scheidan,[1] and Søren Schmidt-Olsen[1]

Conclusion. **In recreational and elite athletes, MRI revealed BME in an average of 3–4 SI joint quadrants, meeting the ASAS definition of active sacroiliitis in 30–41% of subjects. The posterior lower ilium was the single most affected SI joint region. These findings in athletes could help refine data-driven thresholds for defining sacroiliitis in early SpA.**



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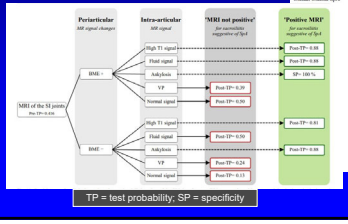
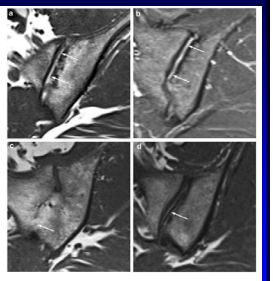
MRI: Intra-articular findings add specificity

MRI of the sacroiliac joints in spondyloarthritis: the added value of intra-articular signal changes for a 'positive MRI'





TP = test probability; SP = specificity

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MRI: sacroiliitis

- Chronic sacroiliitis
  - Peri-articular fat
  - Osseous fusion
- Distribution:
  - Bilateral, symmetric: ankylosing spondylitis, IBD
  - Bilateral, asymmetric: psoriatic, reactive arthritis
  - Unilateral: septic joint (look for soft tissue edema)

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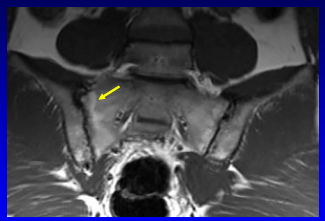
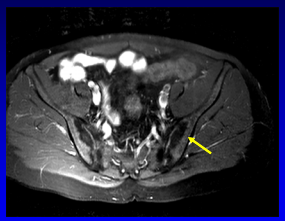
Ankylosing Spondylitis: Chronic





*Note: peri-articular marrow fat signal

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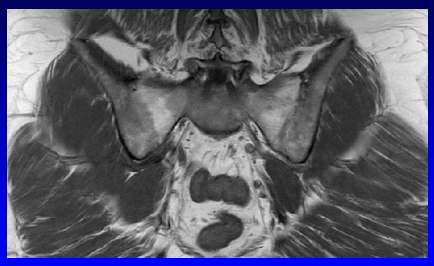
Ankylosing Spondylitis: fusion



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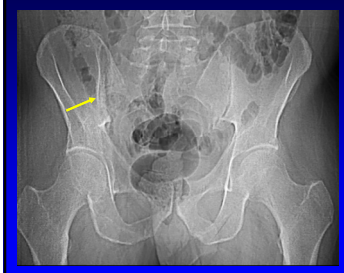
Septic Joint



*Note: loss of subchondral bone plate with erosions

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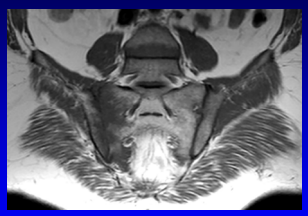
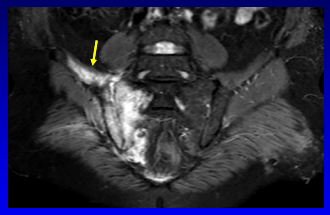
Septic Joint





*Note: associated soft tissue fluid signal

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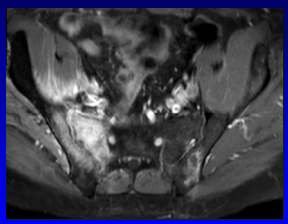
Septic Joint



Post IV gadolinium: important for showing soft tissue abscess (not present here…yet)

Unilateral Sacroiliitis: Differential Diagnosis Between Infectious Sacroiliitis and Spondyloarthritis Based on MRI Findings

OBJECTIVE. The purpose of this study was to identify the MRI features that aid in the differentiation between infectious sacroiliitis and unilateral sacroiliitis associated with spondyloarthritis.

MATERIALS AND METHODS. The MR images of 54 patients who received a diagnosis unilateral sacroiliitis between August 2001 and August 2013 were reviewed. MR images were evaluated for bone lesions (extent and distribution of bone marrow edema and presence and size of bone erosions), soft-tissue lesions (capsulitis, extracapsular fluid collections, and periarticular muscle edema), and joint space enhancement. The Fisher exact test was used for comparison of categoric data, and multivariate stepwise logistic regression analysis was performed.

RESULTS. Thick capsulitis, extracapsular fluid collection, and periarticular muscle edema were all more frequently observed in infectious sacroiliitis ($p < 0.001$). Iliac-dominant bone marrow edema and joint space enhancement were statistically significantly more common in spondyloarthritis ($p < 0.001$ and $p = 0.014$, respectively). The presence of periarticular muscle edema was the only independently differentiating variable on multivariate stepwise logistic regression analysis. When periarticular muscle edema was the sole predictor, unilateral sacroiliitis in spondyloarthritis was correctly identified in 77.3% of cases, and infectious sacroiliitis was correctly identified in 90.6% of cases. The overall accuracy was 85.2%.

CONCLUSION. MRI features of the bone lesions, soft-tissue lesions, and joint space enhancement in unilateral sacroiliitis aid in the differential diagnosis between infection and spondyloarthritis. Among various findings, periarticular muscle edema was the single most important predictor of infectious sacroiliitis.

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Take Home Points

- Synovial aspect of SI joint is not just the lower 1/3
- Joint inflammation is a diffuse process (not focal)
- Bone marrow edema is not specific
  - If focal
  - Without intra-articular findings
- Unilateral SI joint inflammation + soft tissue edema = septic joint
- MRI very sensitive, CT specific (erosions)

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Syllabus on line and additional educational material:
www.jacobsonmskus.com

Twitter handle: @jjacobsn

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