



Axial SpA: MRI criteria and “mimickers”

Evangelia E. Vassalou, MD PhD



Department of Medical Imaging
General Hospital of Sitia, Crete/Greece

Department of Medical Imaging
University Hospital of Heraklion, Crete/Greece

Heraklion, September 2023

Conflict of Interest

Nothing to declare

Spondylarthritis (SpA)

Group of chronic, immune-mediated, inflammatory diseases

Axial (axSpA): dominant involvement of SIJ and spine

- Radiographic: established sacroiliitis on CR
- Non-radiographic: absence of definite sacroiliitis on CR, positive MRI

Peripheral: involvement of peripheral skeleton

The Assessment of SpondyloArthritis international Society (ASAS)

≥ 3 months of back pain, age < 45 years

Imaging Arm

**Sacroiliitis* plus
≥ 1 SpA feature ****

Sensitivity/Specificity: 66.2/97.3

* Sacroiliitis (CR or MRI):

- Definite radiographic sacroiliitis according to modified New York criteria

OR

- Active inflammation on MRI highly suggestive of sacroiliitis associated with SpA

OR

Clinical Arm

**HLA-B27 plus
≥ 2 SpA other SpA features ****

Sensitivity/Specificity: 83.3/83

Grade ≥ II bilaterally

OR

Grade ≥ III unilaterally

- Uveitis

1 BME lesion on 2 consecutive slices

OR

2 BME lesions on a single slice

- Family history of SpA
- Elevated CRP
- HLA-B27

Advantages of MR Imaging

- Visualization of active inflammatory lesions
 - Early in disease course (*1-2 w after onset of symptoms, >5 y for X-rays*)
 - Inconclusive radiographic findings (nrAxSpA)
- Depiction of structural lesions early in the disease course
- Monitoring of disease activity and assessment of response to therapy

SIJ involvement in aSpA

MR imaging findings

Inflammatory lesions

1. BME / osteitis
2. Synovitis
3. Enthesitis
4. Capsulitis

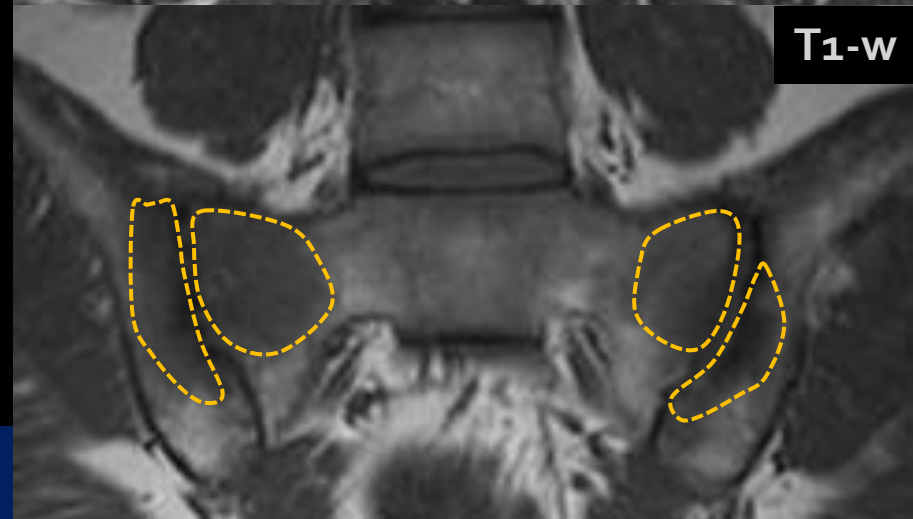
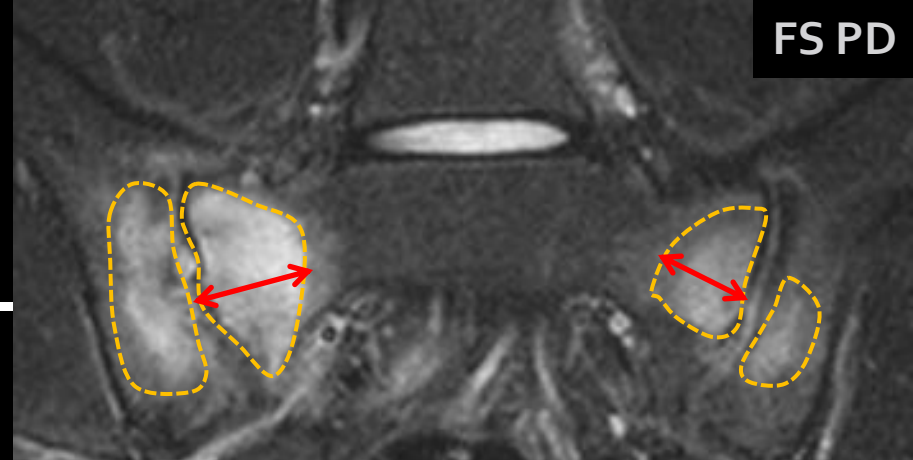
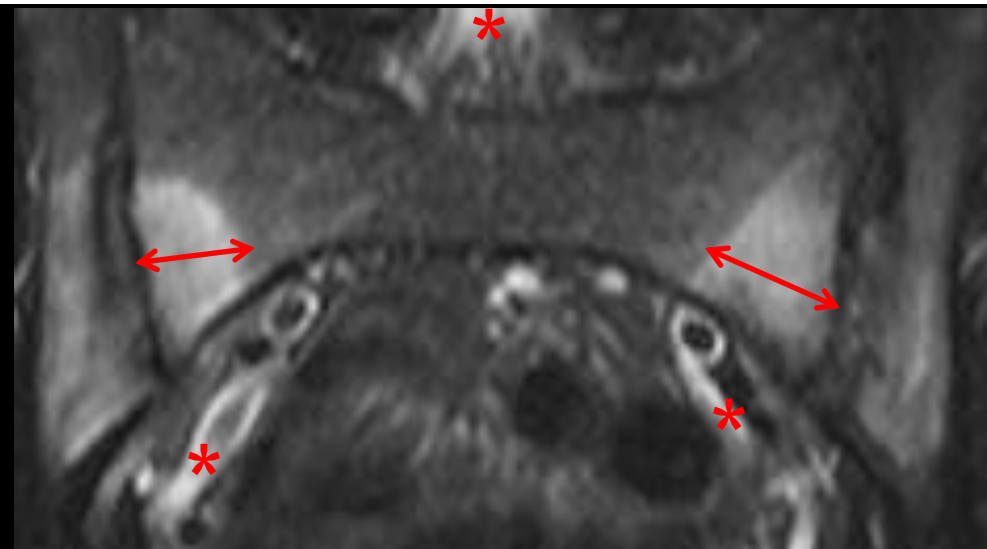
STIR
FS PD/T₂

Structural lesions

1. Erosions
2. Subchondral sclerosis
3. Fatty deposition
4. Bony bridges/ankylosis

T₁-w

BME/osteitis



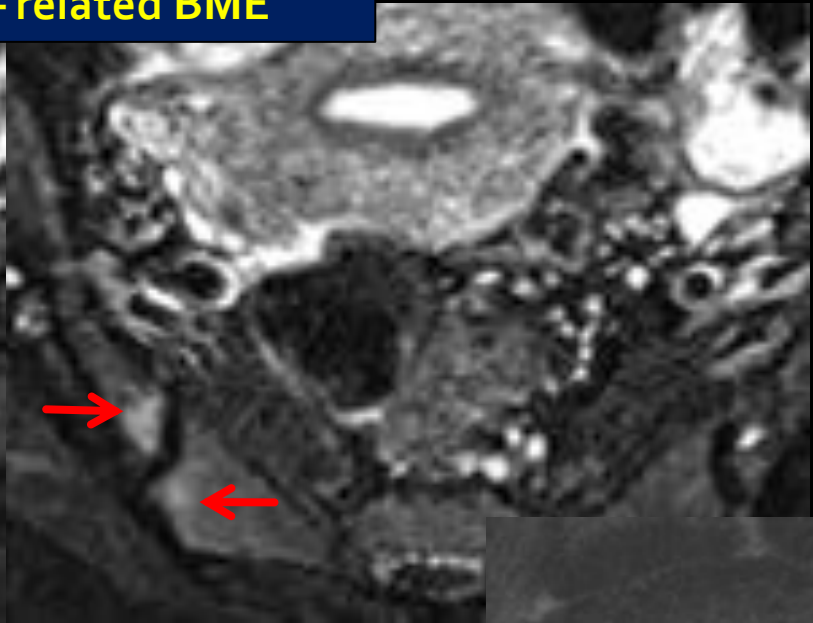
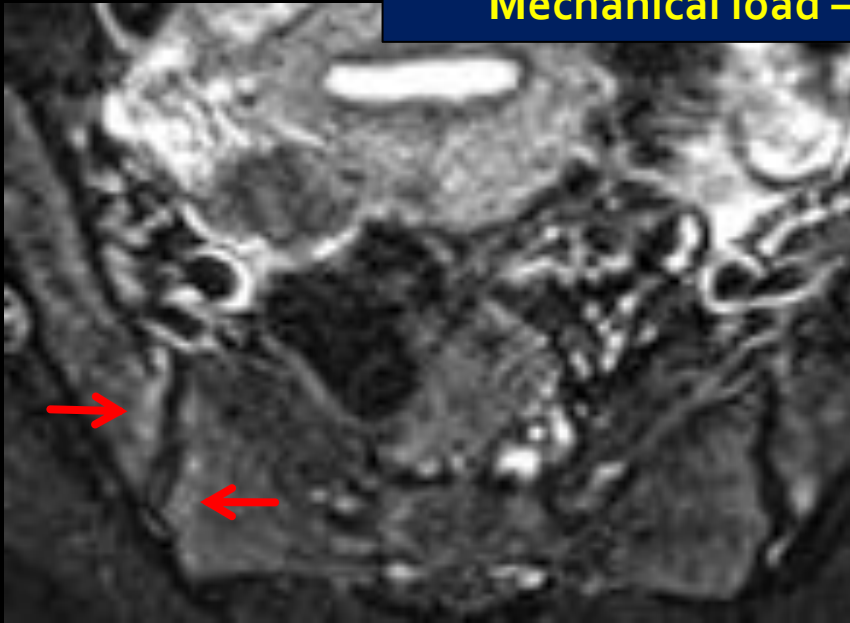
BME / osteitis

1. High SI (CSF, vessels) T2/STIR, Low T1
2. Depth: > 1cm from articular surface

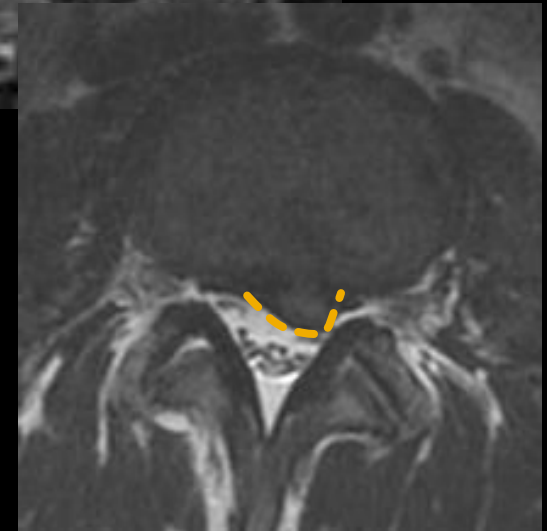
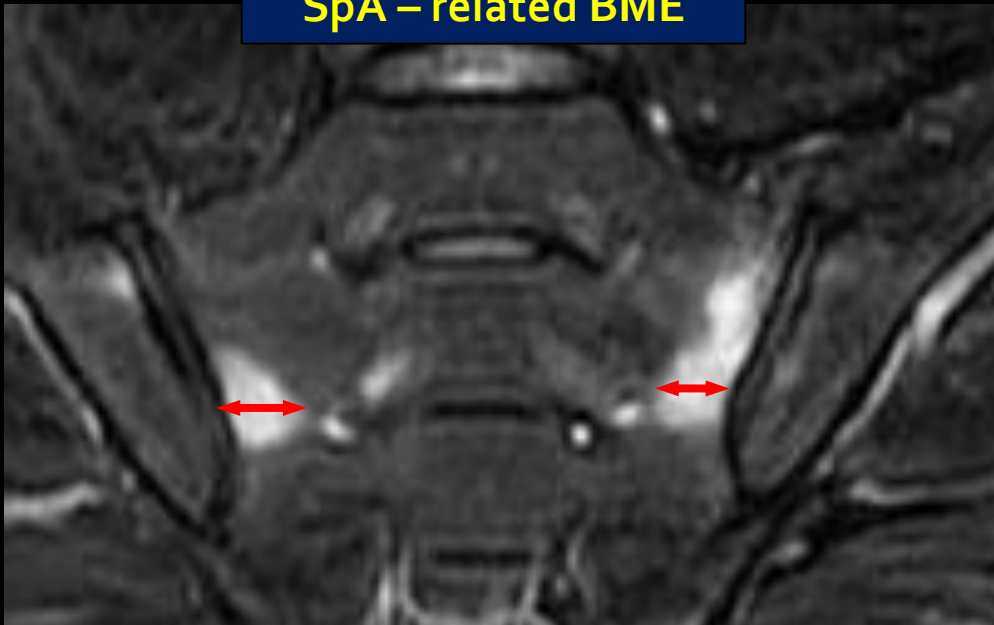
Small BME foci: in 17% - 41% of healthy controls, populations exposed to mechanical load



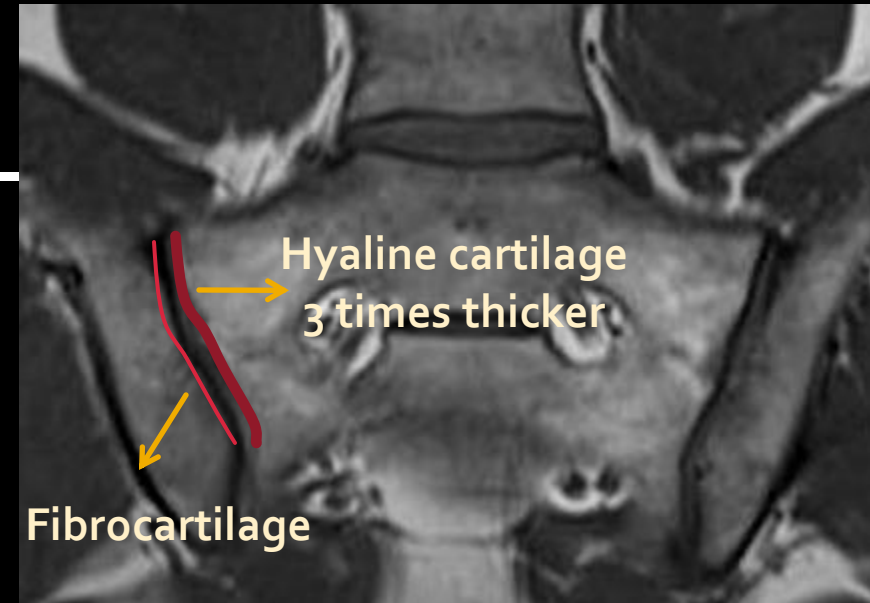
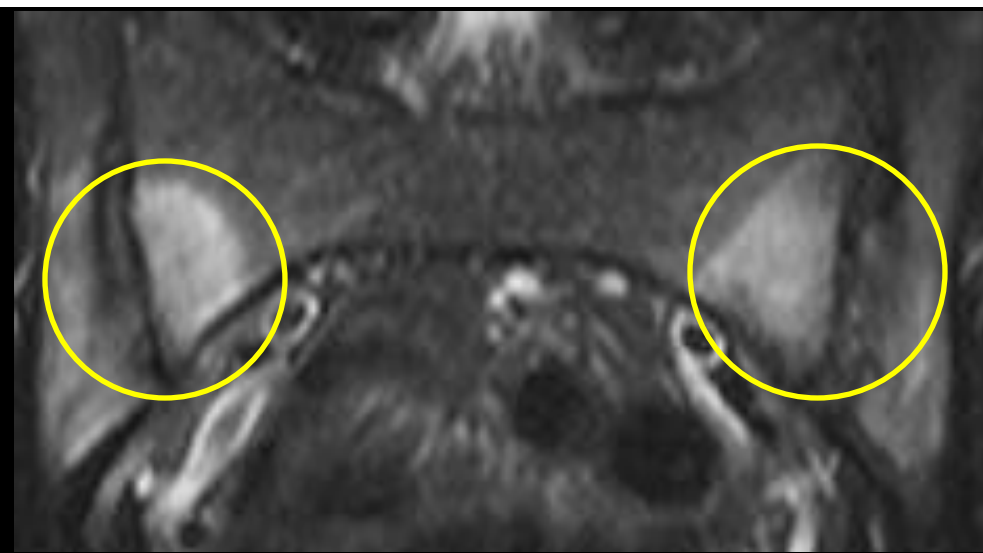
Mechanical load – related BME



SpA – related BME



BME/osteitis



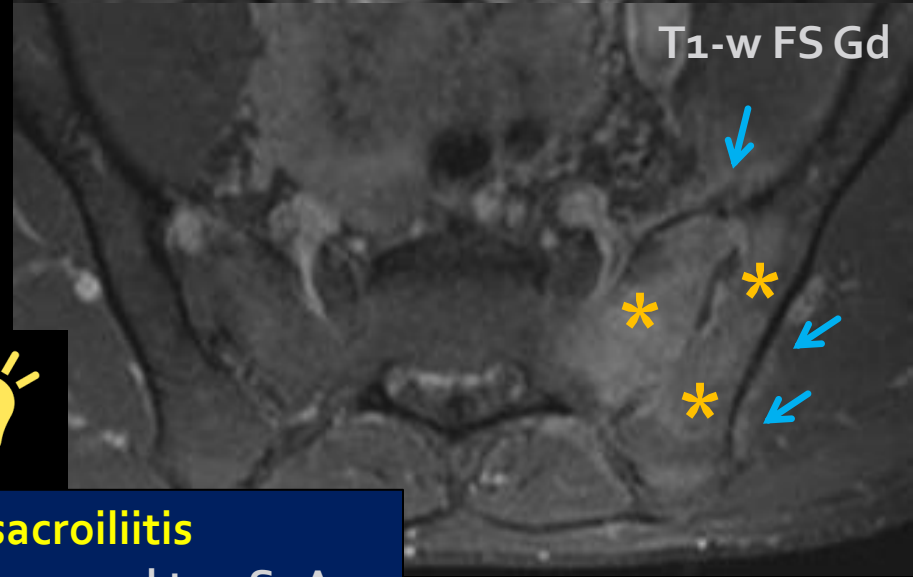
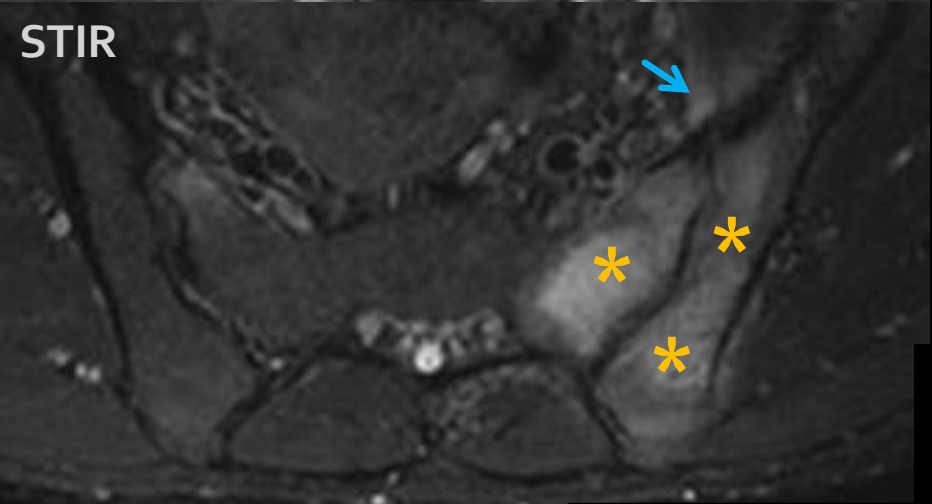
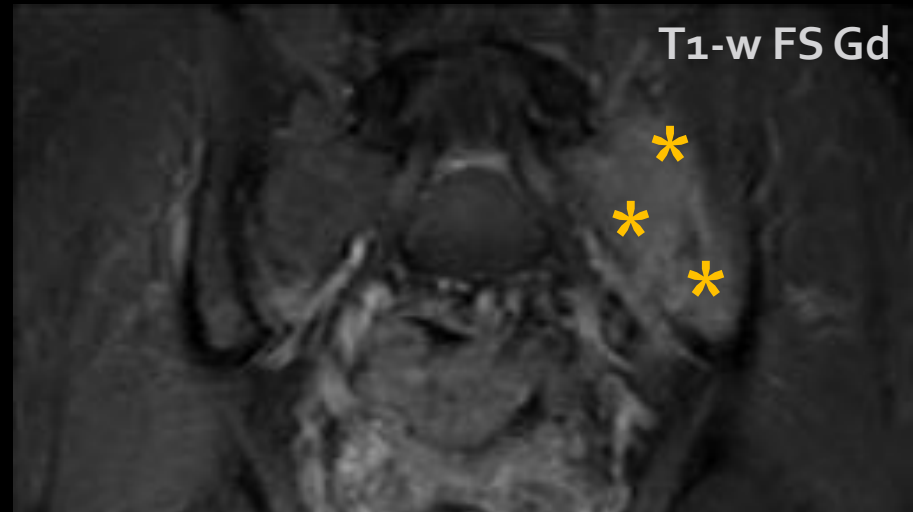
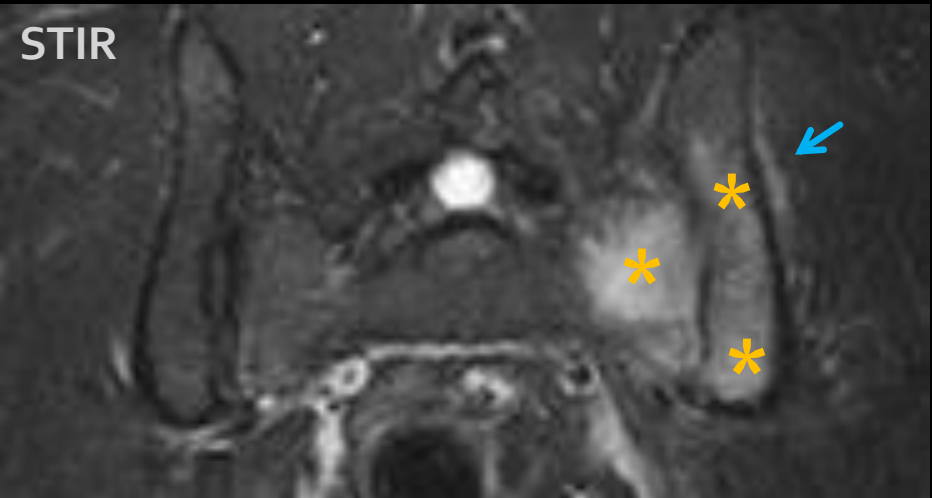
BME / osteitis 1-2 w after onset of symptoms

1. High SI (CSF, vessels)
2. Depth: > 1cm from articular surface

Small BME foci: in 17% - 41% of healthy controls, populations exposed to mechanical load

3. Location: subchondral, dorsocaudal part of SIJ, bilateral, iliac side first

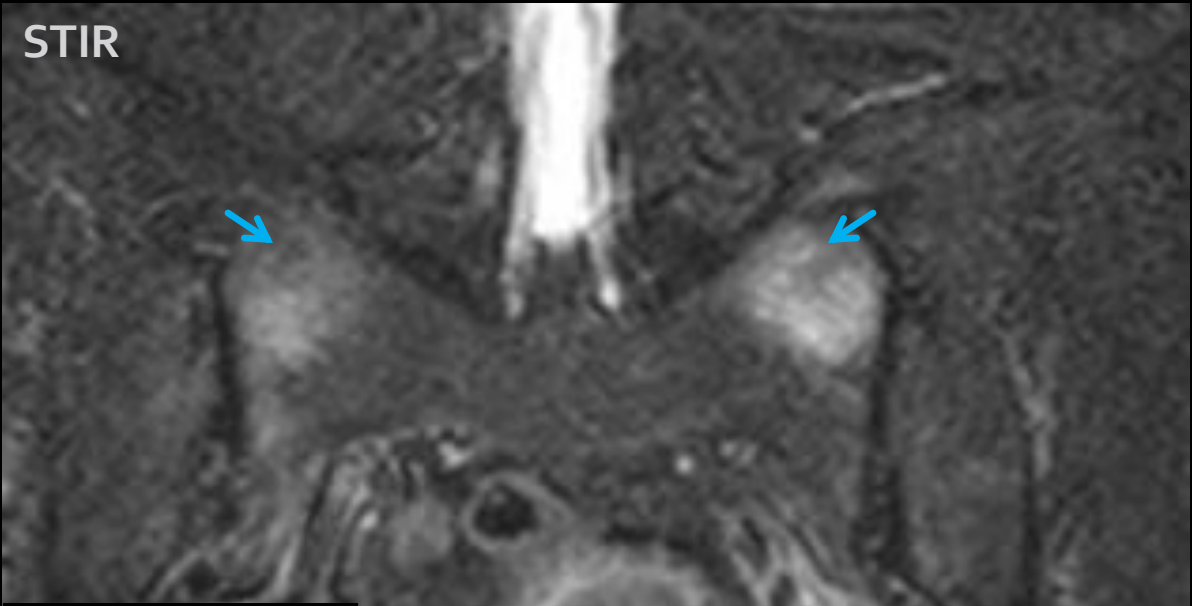
BME/DD



Infectious sacroiliitis
Extensive BME compared to aSpA
Unilateral
Muscle infiltration – abscess formation
Clinicolaboratory data

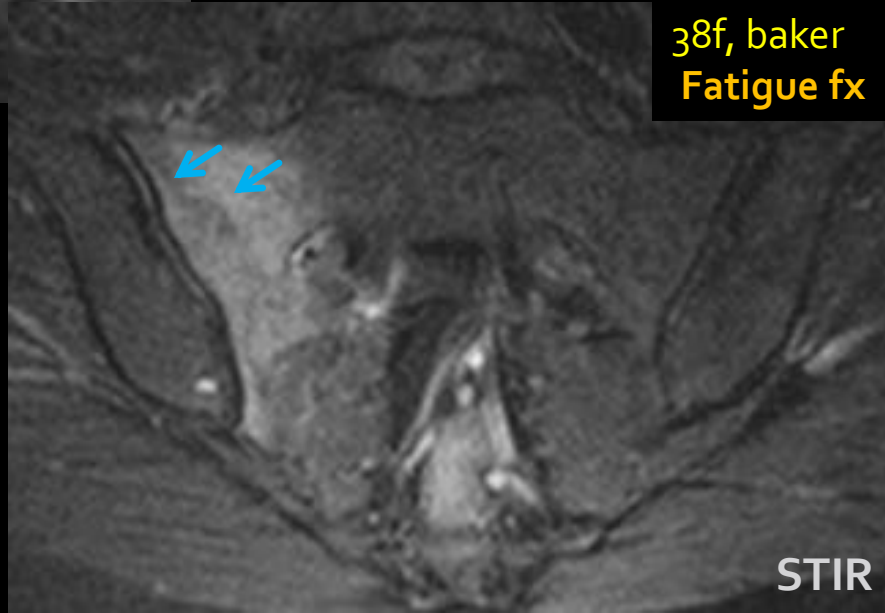
Stürzenbecher A, et al. *Skeletal Radiol* 2000;29:439-46
Jans L, et al. *Eur J Radiol* 2014;83:179-184

BME/DD



64f, osteoporosis
Insufficiency fx

Stress fractures
Unilateral/bilateral
Sacral wings
Fracture line
Extensive BME
Absent iliac changes



38f, baker
Fatigue fx

BME/DD

13m, tennis player, deep gluteal pain

T1-w



STIR



Normal bone marrow

Age

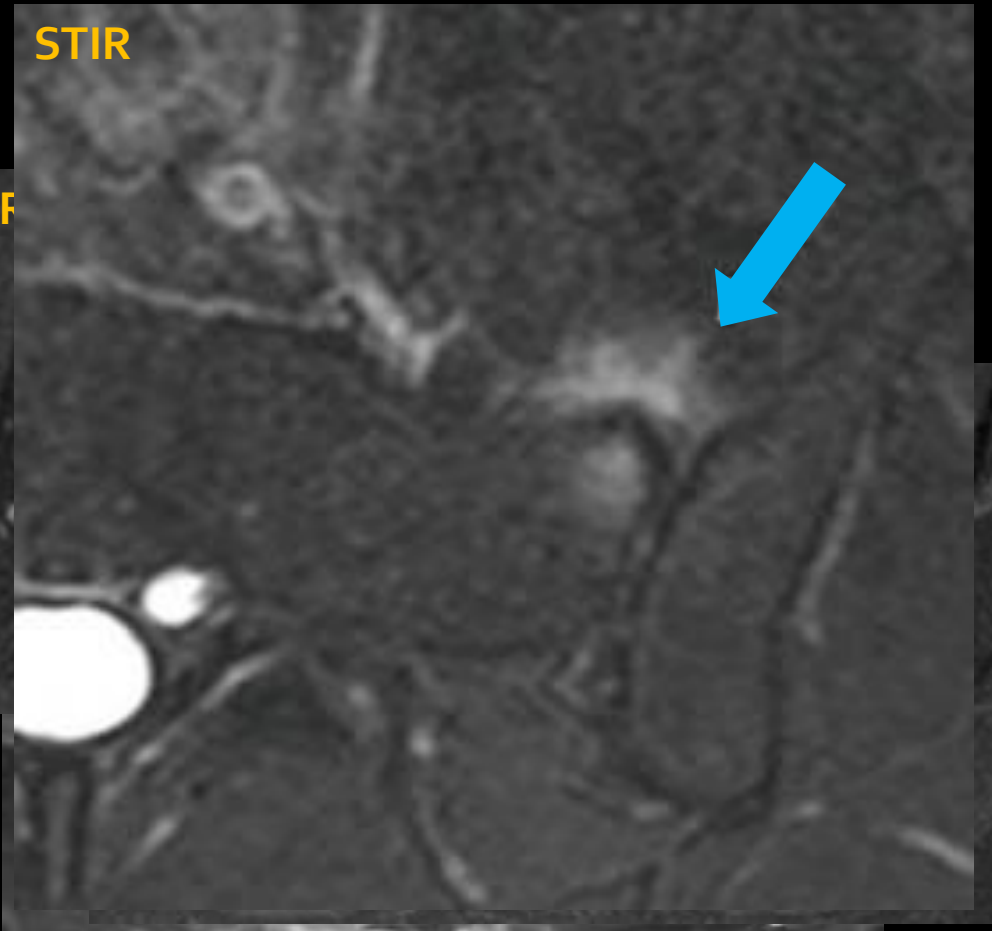
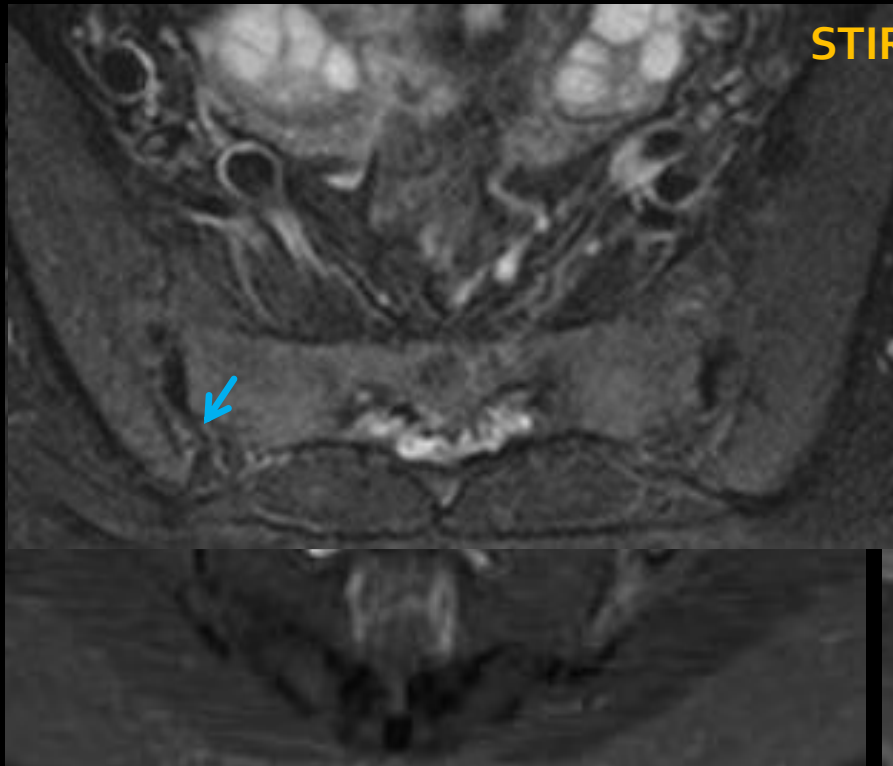
History (physical activity)

Red marrow SI (STIR) < BME

Synovitis, enthesitis, capsulitis

Enthesitis

1. Ligamentous part rior capsule
2. T1-w FS Gd



Subchondral sclerosis, fatty deposition, ankylosis

Subchondral sclerosis

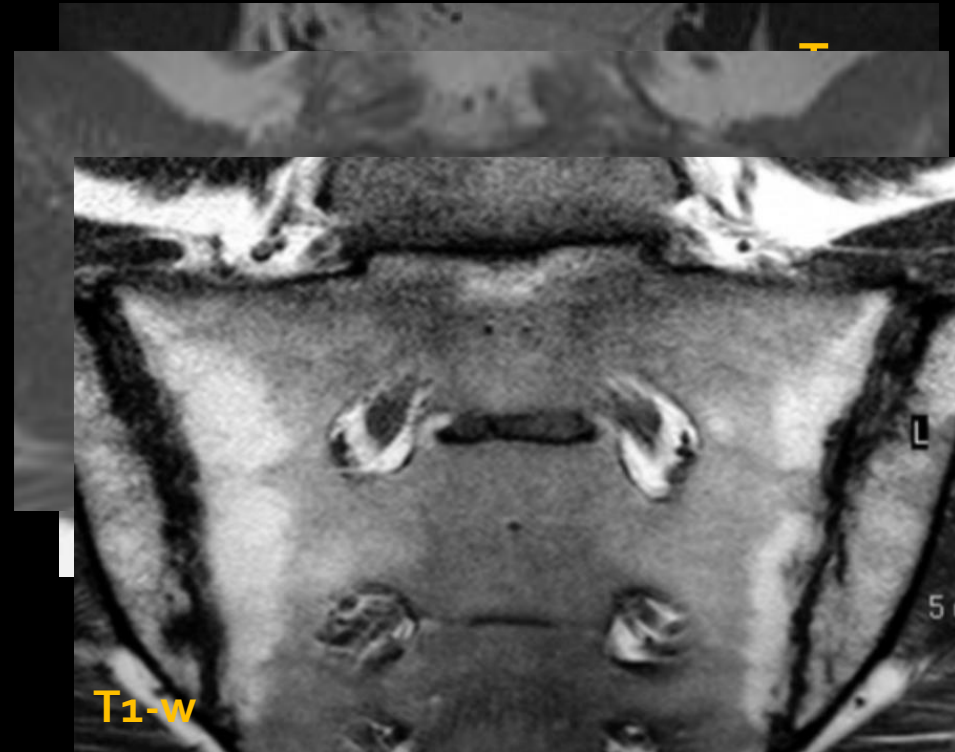
1. Low SI on all sequences
2. Iliac side, > 5 mm

Fatty deposition *healed inflammation*

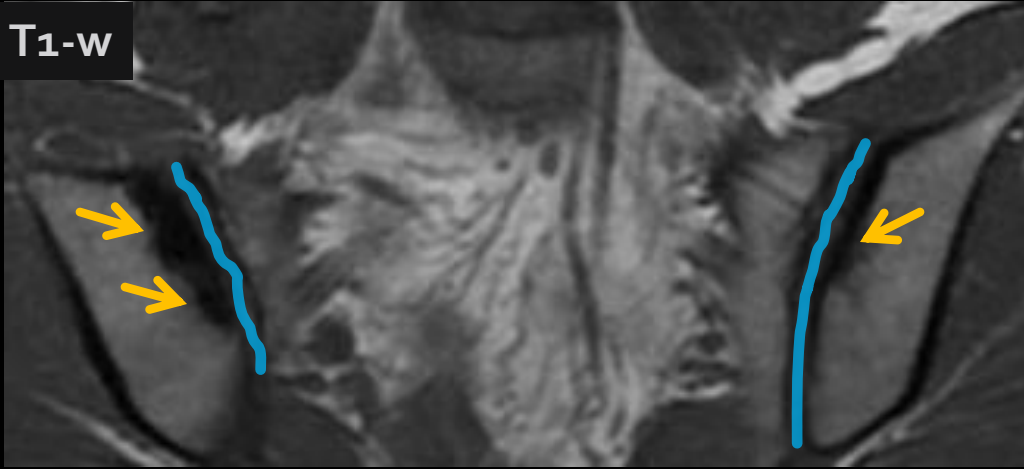
1. High SI T1-w
2. Low SI on FS sequences

Ankylosis

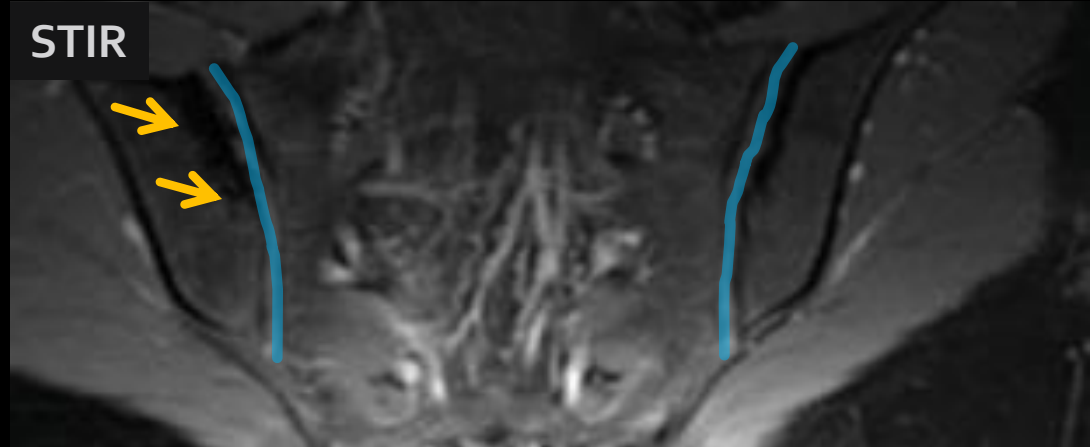
Lost joint space



T1-w



STIR



Condensans ilii

Triangular subchondral sclerosis

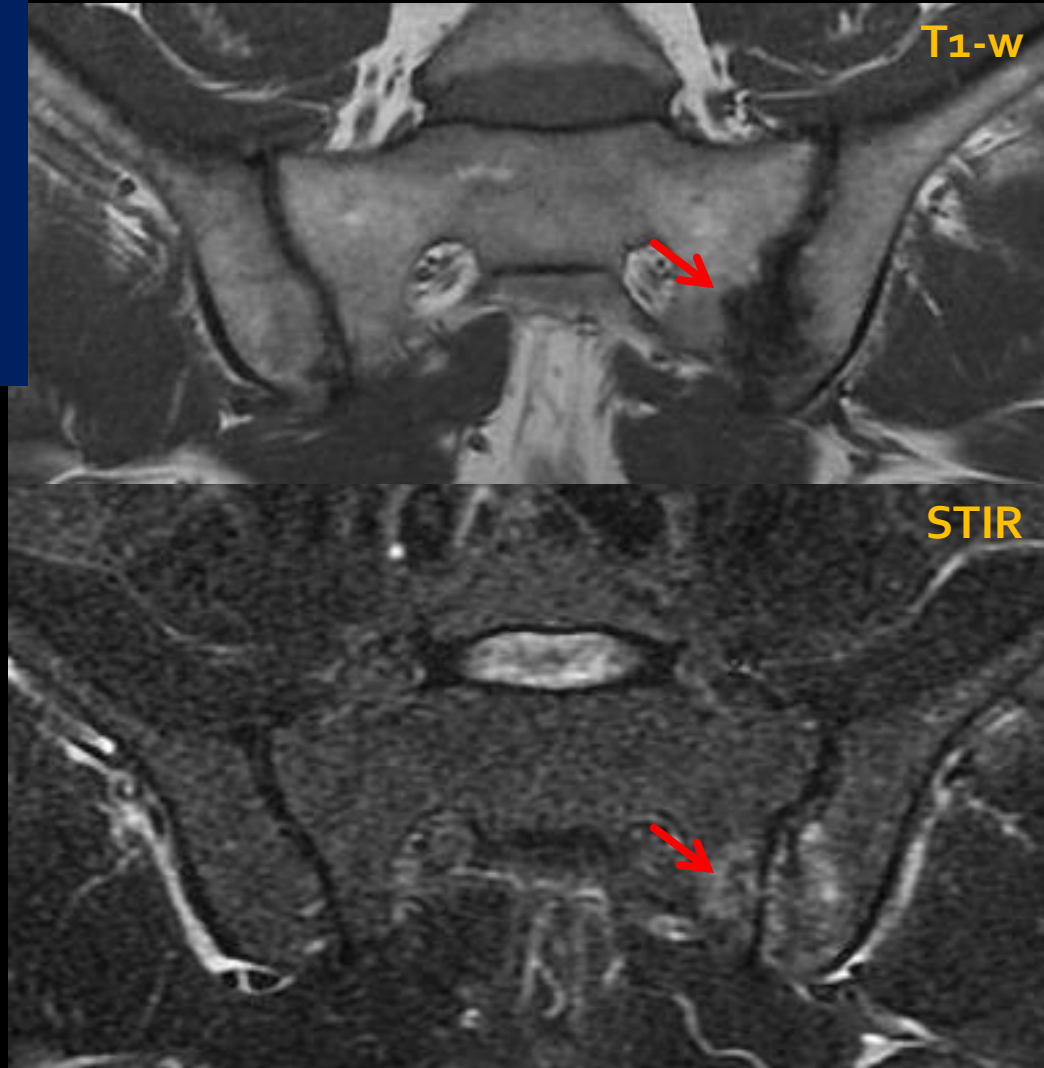
Anteroinferior part, iliac side (predominantly)

No erosions, fatty deposition, joint irregularity

Erosions

Erosions

1. Low SI on T1-w
2. High SI fluid sensitive/Gd when active
3. Synovial part of SIJs
4. Isolated, confluent



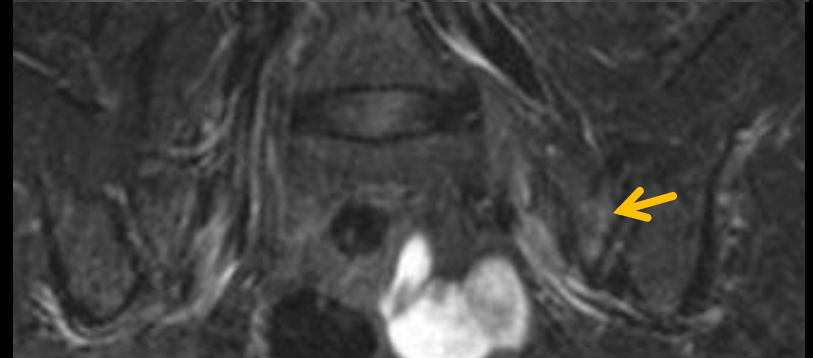
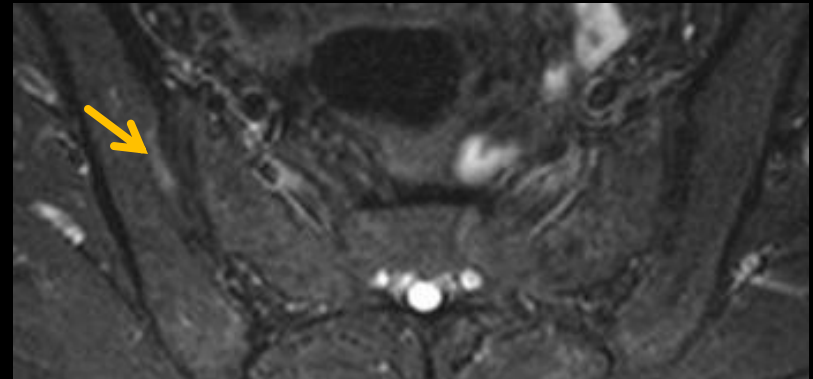
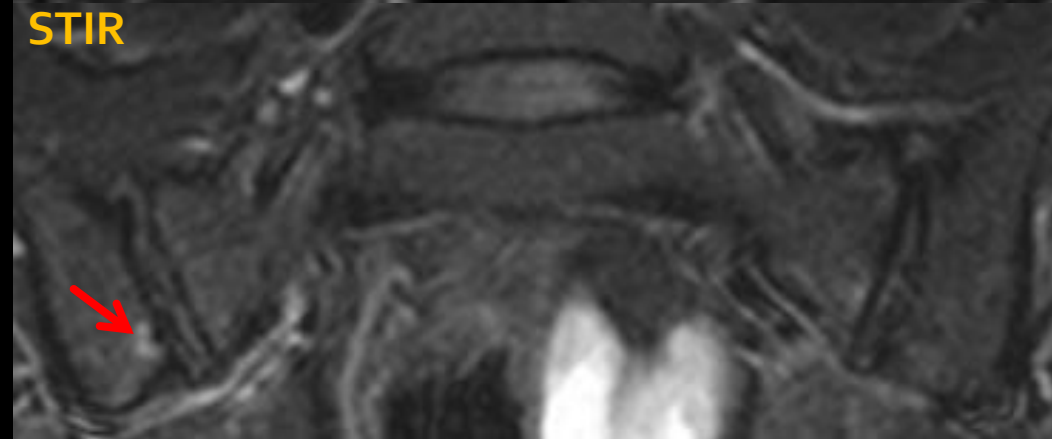
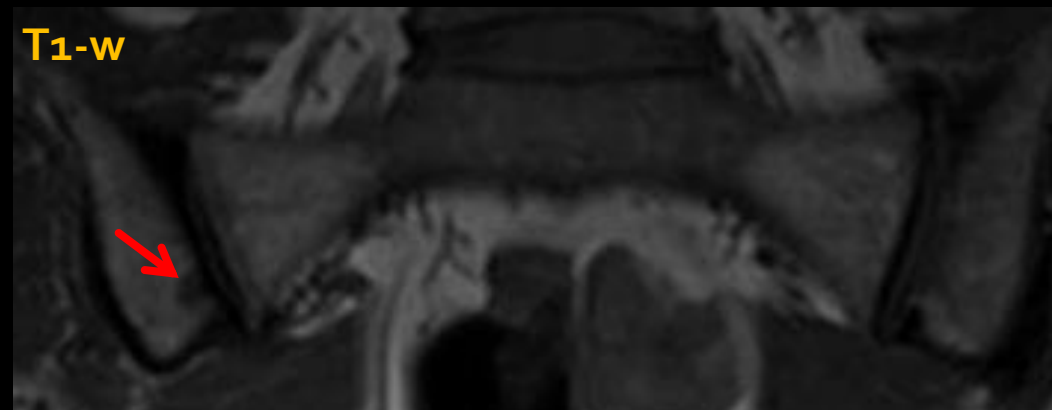
Erosions

“key structural lesion by superior specificity and reliability”

Erosion(s) + BME: increase specificity for axSpA

- 95% for BME + erosion(s) compared to 76% for ASAS definition

* *diagnostic value in subtle BME / populations exposed to mechanical load*



Erosions

“key structural lesion by superior specificity and reliability”

Erosion(s) + BME: increase specificity for axSpA

- 95% for BME + erosion(s) compared to 76% for ASAS definition

** diagnostic value in subtle BME / populations exposed to mechanical load*

Erosions in axSpA:

- frequent (60% - 90% of patients with axial SpA)
- appear early (mean symptoms duration of 2.5 years)
- occur in the absence of BME in ~ 11% of patients with suspected axSpA

Weber U, et al. Ann Rheum Dis 2015;74:1976-82

Jans L, et al. JBR-BTR 2014;97:202-5

Weber U, et al. Arthritis Care Res 2010;62:176371

Maksymowych WP, et al. Arthritis Res Ther 2017;19:126

**Contextual interpretation of active and structural lesions:
enhances diagnostic utility of MRI in patients with suspected
axSpA**

MR imaging in axSpA

BME: cardinal feature of axSpA

- ✓ 1 cm
- ✓ high SI } *dd. mechanical changes*
- ✓ subchondral, bilateral, iliac side first, dorsocaudal part of SIJ

Erosions:

- ✓ key structural lesion by superior specificity
- ✓ diagnostic value in subtle BME / populations exposed to mechanical load
- ✓ contextual interpretation of active and structural lesions

DD.

- ✓ Stress-related edema
- ✓ Infection
- ✓ Stress fractures
- ✓ Normal bone marrow
- ✓ Condensans ilii

Thank you!

Evangelia E. Vassalou, MD PhD

vassalou.e@hotmail.com; medp1483@med.uoc.gr